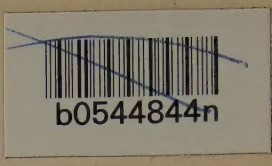
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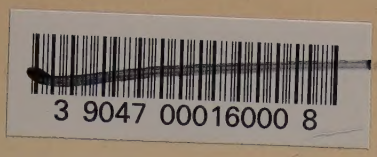

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LIVES
OF
GAME ANIMALS
Volume III — Part II

LIVES

OF

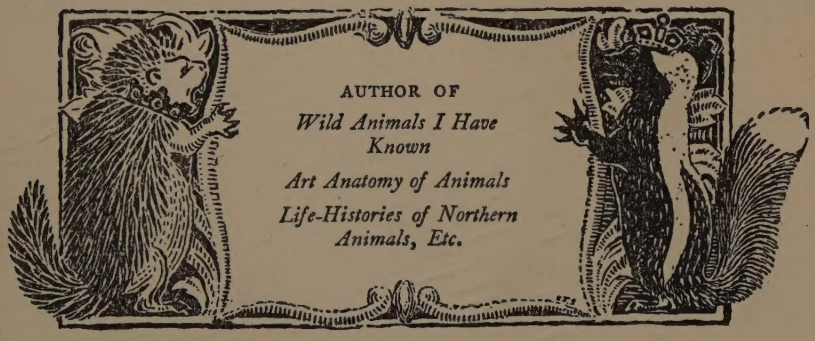
GAME ANIMALS

An Account of those Land Animals in America, north of the Mexican Border, which are considered "Game," either because they have held the Attention of Sportsmen, or received the Protection of Law.

BY

ERNEST THOMPSON SETON

FELLOW NEW YORK ZOOLOGICAL SOCIETY
MEMBER NAT. INST. ARTS AND LETTERS



WITH 50 MAPS AND 1500 ILLUSTRATIONS
BY THE AUTHOR

VOLUME III — PART II
HOOFED ANIMALS

GARDEN CITY NEW YORK
DOUBLEDAY, DORAN & COMPANY, INC.
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LIVES
OF
GAME ANIMALS

Volume III — Part II

Order Ungulata or Hoofed Animals

DEER, ANTELOPE, SHEEP, CATTLE, AND PECCARY

The Common Prongbuck, Prong-horn, Antelope or Prong-horned Antelope of America, Cabrit or Cabrie, Pied Goat of the Plains

Antilocapra americana (Ord)

(*Antilocapra*, name compounded by Ord, in 1818, out of L. *Antilope*, an Antelope, and *capra*, a Goat; *americana*, of America)

Antelope americana Ord, 1815, Guthrie's Geogr., 2d Am. ed., II, p. 292 (descr. on p. 308).
Antilocapra americana Ord, 1818, Journ. de Phys., LXXXVII, p. 149.

Type Locality—On the plains and the highlands of the Missouri

French Canadian, *le Cabrit*
Cree, *Ah-pi-chee Ah-tik* (small Caribou)
Yankton Sioux, *Tah-chah Chis-teeh-ah* (small Deer)
Ogallala Sioux, *Tah-heen-cha Sahla* (little pale Deer)
Mexican, *Berendo*

The Family *Antilocapridæ* is unique. It combines peculiarities of the Giraffes, the Goats, the Antelope, and the Deer. It consists of a single genus, *Antilocapra* (Ord, 1818); and this consists of one species, found only in North America. Therefore the characteristics of the animal are the characteristics of the genus and of the Family.

The American Antelope is a ruminant, which, like the Giraffe, has two hoofs on each foot; like the Goat, it has a gall-bladder and a system of smell-glands; like the Deer, it has 4 teats and a coat of hair, with an undercoat of wool; like the Goat, it has hollow horns on a bony core; yet, as in the Deer, these horns are branched, and are shed each year.

Size. Total length of ♂, 52 in. (1,320 mm.); tail, 3½ in. (89 mm.); hind foot, 17 in. (432 mm.). A fair-sized buck stands 36 in. (914 mm.) at the shoulder, the top of the head rising a foot higher. A 4-months-old buck which I took in Jackson Hole in Oct., 1898, stood 28 in. at the shoulder. The ♀ is about 10 per cent. less.

Weight. An ordinary buck weighs about 100 lbs. The above-mentioned 4-months buck weighed 60 lbs. A large one, killed by E. S. Dodge,

of Oracle, Ariz., weighed 125 lbs.[1] Mearns gives an adult buck at 112 lbs.[2] The ♀s are usually smaller and lighter, but Mearns gives an adult with 2 unborn young at 109 lbs. after bleeding.[3]

In Nelson's Monograph, he quotes E. R. Sans, referring to the kids, as follows: "We shipped some of them on the 9th of September, when their average weight was 42 pounds, at 3½ months of age. They ranged in weight from about 35 up to 50 pounds each."[4]

Colour. The colour of the adult *male* Antelope is a rich tan, varied with pure white patches, as shown in the Plate; that is to say, the sides of face, nape of neck, base of ears, two bars on throat, breast, belly, rump, and inside of limbs are white. The upper part of the muzzle, the patch under each ear, the eyes, horns, hoofs, and sometimes the mane, are black.

The *female* is similar in colour, but the black areas are less, and those under the ears are often lacking. Also, I have seen more than one big buck without the black patches under the ear. Occasionally, specimens are seen with a distortion of the usual pattern on the throat, as though the stencil had been jarred when the work was half done.

The young are at first grayish brown, darkening on the face, paling on the rump, and with faint suggestions of the adult colours and pattern; but never are spotted as in the Deer Family. They assume the adult colours toward the end of their first summer.

Races

The following races have been described:

americana Ord, the typical form. T. l., "Plains and highlands of the Missouri."

mexicana Merriam, a pale race. T. l., Sierra en Media, Chihuahua, Mex.

peninsularis Nelson, a dark race, much like *americana*, but with darker face-marking, a dark band joining tail and back, and with short, roughened horns; teeth heaviest of the three. T. l., 45 miles south of Calmalli, Lower Calif.

History

In that eventful *anno domini* 1535, when Jacques Cartier ascended the St. Lawrence to be the white discoverer of Hochelaga (Montreal), Francisco

[1]Recreation, Oct., 1898, p. 307.
[2]Mamm. Mex. Bd., p. 226.
[3]As above.
[4]Pronghorn, p. 20.

Vasquez de Coronado landed in Mexico, and became a pioneer and an empire-builder of world-wide fame. Five years later, he set forth on his memorable march northward as far as Kansas, discovering and possessing in the name of the Cross and the King. Thus, he may have been the first white man to see the Antelope.

Yet this ruthless old pirate was so poor an observer of animals that we find in the various accounts of his march nothing more than these rather doubtful mentions of the Antelope that he certainly saw in hundreds of thousands on probably every day of that historic march, once he had gone north of lat. 30°. Casteñada, his recorder, writes:

"Between Suya and Chichilticalli [Casa Grande, Ariz.] there are many Sheep and Mountain Goats with very large bodies and horns. Some Spaniards declare that they have seen flocks of more than a hundred together, which ran so fast that they disappeared very quickly."[5] The combination of the words "Goat," "great speed," and "plains," certainly, in that region, indicates Antelope.

Later, July, 1540, the expedition reached the Buffalo Plains of Cibola in central New Mexico. The Buffalo he calls "cows" and Casteñada continues:

"There are very great numbers of Wolves on these plains, which go around with the Cows [Buffalo]; they have white skins. The Deer are pied with white."[6] There are Deer in the region, but they are not pied with white, and are much less conspicuous than the Antelope. The association of these 'Deer' with the Cows (Buffalo) is significant.

Coronado himself, writing to Mendoza, of the Zuni or Cibola pueblos, says: "There are also wild Goats, whose heads I have seen."[7] Perhaps the best of these records is found in Mendoza's letter to the King, April 17, 1540, concerning Coronado's trip. He says: "There is a great abundance of wild Goats, the colour of bay Horses."[8]

There is, however, another claimant for the honours of discoverer, and on that same year. Nelson, in his recent monograph on the Antelope, writes:

"The first record of the Pronghorned Antelope having been seen by Europeans was published in 1723 in Torquemada's "Monarquia Indiana" (Vol. I, Book 5, pp. 611–12), in which is described a great hunt made in honour of the viceroy, Antonio Mendoza, in 1540, at a place in the extreme

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[5]Coronado Exped., p. 516.
[6]As above, p. 528.
[7]As above, pp. 559–60.
[8]As above, p. 550.

southwestern part of the State of Hidalgo and adjoining parts of the State of Mexico. The plain on which the hunt occurred has been known from that day to the present as the Llano del Cazadero in commemoration of this event. The station of Cazadero, on the main line of the Mexican Central Railroad, marks this vicinity.

"The hunt took the form of a great drive of game by the Indians, during which, the author states, 600 Deer were killed, among which were large Stags 'and those which they call Verrendos.' He states that the Verrendos did not occur in Spain, and that 'they not only ran but flew,' thus indicating that the remarkable speed of these animals attracted the attention of the first European observers."[9]

But Coronado and his contemporaries, when they discovered the Antelope, were too busy adding to the spiritual kingdom of their masters, in consideration of the material plunder thereof, to bestow a second thought on this wonderful wild thing. It remained for Lewis and Clark,[10] 270 years later, to give the world detailed information about the Pronghorn of the Plains.

Historical Names

There is much of history in its names. From Mexico to the Saskatchewan, it has been called "Goat." Yet, as we have already seen, Mendoza in 1540 called them "Verrendos." Charles F. Lummis writes me: "Herrera mentions them under their proper name of 'Berrendos.'[11] I do not recall any mention of them in Gomara." In Mexico, to-day they are universally called "Berendos."

The word "Cabrit" or "Cabrie" used by the half-breeds of the Northwest may be, as Richardson suggests,[12] a Basque corruption of the Spanish *cabra*, a Goat.

The Century Dictionary, without hesitancy, derives it from the Spanish *cabrito*, a kid—old French *cabrit*, a kid.

The fact that Lewis and Clark, the English fur-traders and the earliest Spanish explorers, call it "Goat" helps this idea. But Doctor Coues thinks Cabra, Cabbrie, Caberey, etc., may be a native word adapted. He says "it occurs in early annals of the Northwest under circumstances which lead me to believe it an entirely different word [from Latin *capra*] of Indian origin."[13]

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[9]Pronghorn, pp. 1–3.
[10]Journal, Biddle edition, 1814, I, p. 122 *et seq.*
[11]Decade, II, p. 288, 1601.
[12]F. B. A., I, 1829, p. 262.
[13]Henry's Journ., I, 1897, p. 191.

The names *Le Squenoton* and *Squinaton*, recorded by Dobbs and his anonymous predecessor,[14] probably do not belong to this species.

In 1651, Hernandez described[15] this animal. He calls it *Teuthlalmaçame* or *Temamaçame;* evidently these were the native Aztec names, and in the same paragraph he uses the name "Berendos."

Range in General and in Manitoba

The map shows the Antelope to be by choice a creature of the high and open plains; although in California and Texas, it was originally found down nearly to sea level. Its preference is the flat country; yet it is often found on rolling or hilly lands, and occasionally in small parks or forest openings; its prime requisite being that its feet rest on hard, dry ground.

Its primitive range covered about 2,000,000 square miles.

Formerly the Antelope abounded on the high prairies of southwestern Manitoba, as attested by several old records:

In the fall of 1801, Alex. Henry built a trading post at the mouth of the Pembina River, near the present St. Vincent. Here he lived, traded, and scribbled for several years. His journal shows that Buffalo were abundant about the fort. The only mention he makes of Antelope is this.[16]

"Nov. 15. An Indian brought me a large Cabbri which had four inches of fat on the rump."

In 1806, Henry was travelling W. S. W., from Portage la Prairie, Manitoba, through the Brandon Hills, and says:[17]

"July 14. From the summits of these high barren hills we had delightful views. In some low spots were clusters of poplars; to the north we could see the Assiniboine, north of which we could trace the course of Rapid River [Little Saskatchewan], which comes from Fort Dauphin Mountain [Riding Mountain]. Herds of Cabbrie or Jumping Deer were always in sight."

He continued his journey S. S. W. across the Plains of the Souris into what is now Dakota, finding abundance of Buffalo; and records next day from near the Boundary, at a point 14 miles south of Boss Hill, on the west bank of the Souris, close to Butte de Sable:[18] "Cabrie were in sight almost every moment, but so shy that we could not get a shot."

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[14]Quoted by Richardson, F. B. A., I, p. 262.
[15]Nov. Hist., pp. 324–25.
[16]Journal, p. 191.
[17]As above, p. 305.
[18]As above, p. 306.

The following day he wrote:[19]

"July 16. We saw numbers of Cabbrie of two different kinds, some [the bucks] almost as large as fallow Deer and others [the does] much smaller, red and white spotted; the latter had young, and did not appear so shy as those we had seen before. The young ones, sighting us, would run up to us within a few yards, while the dams would come on behind them with more caution, until their curiosity was satisfied."

These are all the very early mentions I can find of this animal in Manitoba.

Antelope were never found along the lower Red River, were rare even on the White Horse Plain, where, however, Captain John Schott of Athabaska Landing tells me he killed two in the spring of 1855. He was then a boy of 14. This is the only evidence I can find of Antelope anywhere near Winnipeg. In 1852 Schott was with a number of Buffalo hunters on the Big Plain, near the site of Carberry, and there saw several bands of Antelope. But nowhere north of the Assiniboine were they plentiful as on the high prairies west of Pembina Mountain.

In 1858, Professor H. Y. Hind, travelling from the United States Boundary on the west bank of the Souris, due north across the Plains of the Pipestone, records[20] for a point apparently 10 or 12 miles north of the Boundary:

"*July 4.* We saw some herds of Cabri, and McKay succeeded in killing a female." But his narrative shows that they were very rare in the region.

In 1874, Dr. E. Coues saw "a few Antelopes" along the Souris River, near the Boundary.[21]

J. T. Brondgeest of Whitewater, Man., tells me that he first came to Whitewater in 1879, and settled down in the fall of 1880; and that in those days, there were plenty of Antelope about. But the last he saw was killed by his father in 1881.

In 1882, when I traversed that whole region, I neither saw nor heard of any Antelope, nor can I learn that they have ever been seen since.

Haunts

The Antelope is essentially a creature of the open country, a product of the wide and arid or semi-arid Plains or adjacent foothills. Yet it was found in the Parks or treeless plains high in the mountains, even when to reach these, it had perforce to journey through woods and rugged passes.

[19] Journal, pp. 310–11.

[20] Assin. & Sask. Expl. Exped., 1859, p. 46.

[21] Birds Dak. & Mont., July 29, 1878, Bull. U. S. Geol. Surv., No. 3, Vol. IV, p. 547.

PLATE LXI.—ANTELOPE SIGHTING DANGER

(*Antilocapra americana* (Ord))

In summer, it adhered to vast open spaces; but winter blizzards brought a change of mind, and the pleasant shelter of the woods and brakes was often sought by the white dappled herds.

Nelson says: "As winter approached, they began to gather in bands, sometimes containing thousands of individuals, and to seek favourable feeding grounds for the winter.

"A band of more than 500 frequented a broken and open pinyon and cedar forest in the part of eastern Arizona where the writer lived in the early '80's. In summer, they broke up and scattered over the more open plains in the adjacent parts of New Mexico and northern Arizona. Numbers of them continued to reside through the year among the pinyon and cedar forests; but the bulk of the band went out on the grassy plains.

"In winter, they were very fond of gathering in the pinyon and cedar forests, where they were sheltered from the cold storms which made the open plains places of discomfort. When within these scrubby sheltering forests, they were especially liable to become victims of predatory animals and hunters.

"Near the base of the Sandia Mountains, in New Mexico, the writer knew of hunters trailing bands of Antelope among the pinyons during long-continued snowstorms, and killing many of them one after the other. . . .

"During the '80's, the increase in the Cattle business was so great in northern Arizona that the Antelope learned many new habits. Among others was that of following range Cattle through a belt of heavy pine forest up to an elevated grassy plateau of about 8,000 feet altitude, lying on the east front of the White Mountains, about the headwaters of the Black, Blue, and Colorado rivers. There, on a wide, rolling open plain, they passed the summer, coming out, on the approach of winter, in company with the Cattle. This change was comparable to that which caused the Elk, once a habitant of the foothills and adjacent plains, to become an animal of the higher elevations. During this period, Antelope became frequenters of the open, grass-grown, yellow-pine forests of the mountain areas not only in various parts of the United States, but also in the Sierra Madre of Chihuahua, Mexico."[22]

Home Range

My own experience with this animal has been chiefly on the Plains of the Canadian River and in western Wyoming. I was there much struck by the smallness of the home locality that seemed to satisfy each band. A level stretch of open prairie two miles across seemed ample range for a herd

[22] Pronghorn, p. 8.

of 20 throughout a whole season. If there was water on it, they seemed satisfied to stay indefinitely. All the records I can find are of similar import. Thus:

Dr. E. L. Munson, U. S. Army, says:[23] "For some weeks, a band of several hundred were in a large pasture 4 miles square, several miles from Havre, Montana."

Dr. C. A. Canfield, of California, says:[24] "Any particular band of Antelopes does not leave the locality where they grow up, and never range more than a few miles in different directions."

W. N. Byers, of Denver, Colo., tells me that for several years in Middle Park, Colo., he used to see one particularly large buck Antelope near the road, within a mile of the same place.

It is a common remark that the Antelope, when hunted, runs in a circle. A little reflection will show that this is true of all animals, and that the circle is always around the region that the creature knows, namely, its own home locality; in this case but 3 or 4 miles across.

Commenting on this, Enos A. Mills says that the home range "is rarely more than 6 or 8 miles in diameter."[25]

During summer, the bands are scattered, but the range of the individual is even smaller. I have seen an old Antelope that made her summer home on the flat top of a butte that was less than 200 acres in extent.

The males seem to be less local at this time than the females; and, like bull Moose, commonly wander in twos. It is quite likely that these two are twin brothers.

Migration

But all this permanent residence of one spot seems to be in regions where the winter is mild and the snow light.

Speaking of the species in Colorado, Mills says: "Antelope in the plains appear to live in the same territory the year round. Many times in winter I have been out on the plains and found a flock feeding where I had seen it in summer. But one snowy time they were gone. I found them about 15 miles to the west, where either less snow had fallen or the wind had partly swept it away. The Antelope were in good condition."[26]

In the northern part of the range, a different habit prevails. At the first heavy snow, the Antelope of the Upper Jackson Hole travel 150 miles southward to the Red Desert. Those on the prairies of the Saskatchewan

[23] Forest & Stream, Feb. 27, 1897, p. 164.
[24] Caton, Ant. & Deer, p. 43.
[25] Watched, p. 184.
[26] Watched, pp. 166–67.

move into the coulees and brakes, 100 miles southward and westward. Those of the Plains near the Rockies go toward the foothills, and those on the open country about the Black Hills flock thither from all points of the compass.

Edwin Carter tells me that the Antelope used to winter in vast numbers about Colorado Springs, and were common in the surrounding country all the rest of the year.

As noted later, Major James B. Pond told me that during a blizzard in the winter of 1868–69, he saw the Antelope crowded in every sheltered valley along the railway line from Cheyenne to Denver.

At Medicine Hat, Alberta, I was informed that a snowstorm in winter would concentrate the Antelope in coulees and places of shelter. But these are temporary congregations, and, according to Dr. E. L. Munson, a few days of fine weather causes them to scatter again. He also remarks[27] that he "found Antelope rare during the summer along the Sun River and the Teton, but reasonably plenty in winter."

Richardson says:[28] "Some of them remain the whole year on the South Branch of that river [Saskatchewan] but they are merely summer visitors to the North Branch [about 200 miles away]. They come every year to the neighbourhood of Carlton-house, when the snow has mostly gone . . . and they retire to the southwards again in the autumn as soon as the snow begins to fall."

Then he adds an item which affords interesting light on the relentless process of developing a migratory instinct. "Almost every year, a small herd linger on a piece of rising ground not far from Carlton-house, until the snow has become too deep on the Plains to permit them to travel over them. Few, or none of that herd, however, survive until the spring, as they are persecuted by the Wolves during the whole winter."

To this, Grinnell adds: "In spring and autumn, the Antelope commonly shifted from summer to winter range and back again, and their migrations were made by regularly established roads, over which all the herd passed; so that at certain crossing places of the rivers, and at certain gaps between the hills, vast numbers of the animals passed along twice each year.

"Such a place was on the Missouri River, not very far below old Fort Berthold, where in autumn vast numbers of Antelope that during the summer had fed on the high coteaux to the northeast of the Missouri, crossed the river to winter in the rough bad-land country of the Little Missouri, and about the Black Hills.

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[27]Forest & Stream, Feb. 27, 1897, p. 164.

[28]F. B. A., I, p. 263.

"Again, at a place not far from old Fort Steel, near the head of the North Platte, there was a pass where many thousands of Antelope crossed each autumn, going south to certain wintering grounds in Colorado."[29]

From this, we may conclude that the Antelope is a creature of small home locality, and a permanent resident there when climate and food-supply permit, as is the case in the southern part of its range. But in the colder, snowier regions, it is driven to journey in search of better conditions; and though these movements are as often northward as southward, they are seasonal and somewhat regular, so that they are true migrations.

A Migration Incident

A curious stampede that took place during one of these movements, is thus narrated[30] by H. W. Skinner, of Chicago:

"Early in the spring of 1890, a party consisting of two trappers and three prospectors, besides myself, were going up the western side of the Green River, in Wyoming, as rapidly as the melting of the snow would allow. The wild animals were going up the river valley at the same time. Large bands of Antelope travelled parallel with us, and being unmolested (as for a number of days not a shot was fired), they would dash by within a hundred yards of us. We sometimes stopped for two or three days at a time, waiting for the snow to melt sufficiently to allow us to go ahead. While making one of these stops, we camped on a gentle slope facing the southwest. The snow had disappeared from the slope, but was still quite deep in the valley through which we were obliged to pass.

"As we lay quietly in our blankets one noon, taking turns at crawling under the wagon to get out of the intense heat of the sun, there suddenly came over the crest of the ridge northeast of us, not more than 50 yards distant, a band of Antelope numbering about 50. Being badly frightened by something, they dashed over the ridge, and were among us before we could spring to our feet. Probably half of the band ran directly through the camp. All tried to sheer off to the right, but the momentum and panic of the leaders were so great that they did not change their course quickly enough to avoid running over us. I do not know that any member of the party was actually struck by an Antelope, although some of the camp utensils were, as I remember the accompanying clatter; and a rifle that had been leaning against the wagon was knocked over and the stock broken. The entire affair was over in a very few seconds, of course. None of us recovered from our astonishment until the Antelope were far away."

[29] When Antelope, p. 582.

[30] Letter, April 3, 1901.

Primitive Numbers

In reading the accounts by Western travellers of a hundred years ago, one is disappointed at the lack of definite observations on even such a conspicuous creature as the Antelope. For example, in Buffalo Bill's autobiography of 328 pages, he mentions seeing Antelope but once, Elk twice, and no other animals, except, of course, Buffaloes.

From old journals, one gets vague, indefinite phrases; such as "generally distributed," "more or less common," "almost constantly in sight."[31]

Capt. J. C. Fremont, writing June 22, 1842, from Little Blue River, southeastern Nebraska, about where Hastings now is, says: "Antelope were seen frequently."[32]

More details are furnished by Rufus B. Sage, writing of his winter camp at Cherry Creek, on the Platte in the Pike's Peak country, Dec., 1842. He says: "The Antelope, too, seemed to have congregated from all parts, and covered the country in one almost unbroken band. Their numbers exceeded anything of the kind I ever witnessed before or since."[33]

H. B., of Albert Lea, Minn., writes: "In the summer of 1873 . . . I went west to Salina, Kan., on the Kansas Pacific—or Buffalo route—thence I went on foot up the Salina River, a long, hot walk of about 40 miles to the northward. . . .

"As I came out into the more open country, I could see thousands of what I supposed were Sheep, but could see no herders, and as I wondered at this, I saw one of the animals running past at short range, and for the moment, it looked like a small Deer. Then it came to my mind it was an Antelope. . . .

"There were bands of hundreds as far as the eye could survey, and here in this clear atmosphere that meant many miles."[34]

G. B. Grinnell, who crossed the Plains in 1874, writes: "Those of us who in the early days travelled the prairie from north to south, and east to west, used to wonder constantly at the great numbers of the Antelope which day after day were seen on all sides of the command, feeding, or resting, or running, in troops of 10 or 20, or 30; and later, when winter approached, gathering into great droves, which always numbered hundreds, and sometimes thousands. . . .

"Abundant as the Antelope was on the plains to the east of the Rocky Mountains, it was not less plenty in the rougher broken country among

[31] J. A. Allen, Nat. Hist. Mont. & Dak., 1874, p. 40.
[32] Expl. Exped., 1843, p. 16.
[33] Rocky Mt. Life, 1857, p. 290.
[34] Forest & Stream, Feb. 6, 1911, p. 177.

San Mateo, California

the mountains. Looking down from the top of a high butte, over a broad basin, in North Park, Colorado, I have seen the country below me almost covered with Antelope of all sizes and ages; and could trace, winding among the sage brush, deep trails which they had worn in their passage between two passes, one of which led into, and another out of, this basin.

"In the same way, on the Laramie Plains, especially at a distance from the railroad, Antelope were always in sight, and in great numbers."[35]

Concerning its numbers farther west, Newberry says: "Though found in nearly all parts of the territory of the United States west of the Mississippi, it is probably most numerous in the valley of the San Joaquin, Calif. There it is found in herds literally of thousands; and though much reduced in numbers by the war which is incessantly and remorselessly waged upon it, it is still so common that its flesh is cheaper and more abundant in the markets of the Californian cities than that of any other animal."[36]

According to J. C. Hoxie, J. S. Drury, S. F. Dickenson, and many other Californian pioneers with whom I talked at Bakersfield, Calif., Oct. 3, 1899, in those early times, bands of 2,000 or 3,000 were seen commonly on the plains of California.

Charles H. Stonebridge, of New York, tells me that in the August of 1875, while crossing Wyoming, he saw daily from 500 to 3,000 Antelope in bands numbering 100 or 200 each. In April, 1879, they were just as plentiful in the same region, also in western Nebraska and in Utah.

Similar testimony is borne by many travellers for the open country east of the Rockies.

In the Dakota Badlands, during the early '80's, they were still abundant. Howard Eaton tells me that, in 1884, he saw there as many as 8,000 and 9,000 in a day. Even as late as 1896, they abounded in Montana. Dr. Edward L. Munson, of the U. S. Army, gives credence to the report that in the great blizzard of December of that year "40,000 Antelope took shelter in the coulees along Milk River alone, in Montana, near his post, Fort Assiniboin," and that between Havre and Glasgow (125 miles) a band of them might be seen every half mile.[37] These probably were the Antelope population of a region a couple of hundred miles across, concentrated in the sheltered valley.

Had they been the entire population of that north end of the range, it would give about one Antelope to the square mile; but we have evidence of many other bands in the country, at least doubling the number. Yet

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[35]When Antelope, pp. 600 and 582.
[36]Pac. R. R. Reports, 6, 1857, Zoology, p. 71.
[37]Forest & Stream, Jan. 2, 1897, p. 7.

we know that Antelope were far from abundant then—in the old-time sense.

During early days in New Mexico (about 1892) we could usually reckon on seeing a band of a dozen or 20 Antelope on the open plains every 10 miles or so, during the fall. The region that I knew, and rode in daily, was some 60 miles long by 5 wide. In this were 5 well-known bands of Antelope, each keeping its own home locality and each numbering about 20. This would give 100 Antelope to 300 square miles. But all the "old-timers" agreed that there were "no Antelope in the country now. Just an odd one here and there, and nothing to compare with the herds of the days gone by," they said.

W. N. Byers, of Denver, tells me that in 1868 he witnessed a Ute "surround" of Antelope in North Park, Colo., where 4,400 Antelope were killed. As the entire Park is 5,000 square miles, only a small part of it could have been driven, and, furthermore, many of those started, escaped. We are safe, however, in putting the numbers as high as 3 Antelope per square mile.

But the Park was not an ideal place for the species. The snows were too deep for a high rate of population. In the Yellowstone Park proper (3,000 square miles, about one third of it Antelope country) there were, according to official estimate in 1896, 1,000 Antelope—that is, 1 to every square mile. Yet hunters considered them very scarce, and said that it would take 20 times as many (that is, 20 to the square mile) to make really "Antelope country." At which rate in primitive times, the total of Antelope might have reached 40,000,000.

Major J. B. Pond once gave me an important item: "In the winter of 1868–69," he says, "I travelled on the railroad newly opened between Denver and Cheyenne. All the Antelope had left the open plains, and were now sheltering among the foothills. For 10 or 12 miles in Cache le Poudre valley and all the way west of the train, about $\frac{3}{4}$ to $\frac{1}{2}$ mile away, was one long band of Antelope, 20 to 40 rods wide, practically continuous, and huddled together for warmth. Their numbers changed the colour of the country. That winter many wagonloads were brought to Denver and sold, 3 or 4 carcasses for 2 bits (25 cents), that being the smallest coin in use."

If there is no error in these figures, it meant 2,000,000 Antelope. This great concourse came from the Plains north and east. They would not have come from the west, because it was rugged mountainous country; nor from the south, because of the storms; and it is extremely unlikely that they came from a greater distance than 200 miles. Reckoned by area, therefore, they represented about the fiftieth part of the Antelope population of

America; this would give over 100,000,000 as the aggregate of Antelope on the range. At this time they must have far outnumbered the Buffalo.

To approach the question from another angle: In 1894, there were, by actual census, over 25,000,000 Sheep in Great Britain, scattered on its 88,000 square miles; that is, there was an average of over 300 Sheep to the square mile. I travelled over the length and breadth of the land, and yet got no impression of abundance of Sheep that could compare with the abundance of Antelope on the Plains. One may argue that the Antelope on the Plains are more visible than the Sheep on the fields. True. Let us, then, divide the Sheep by 10, and claim 30 Antelope for the square mile in the better half of 2,000,000 square mile of their range (that is, the Plains east of the Rockies and in California), and half that much in the other 1,000,000. This would put the Antelope at 45,000,000 as late as the '70's.

Or, to offer it in American terms, the State of Illinois has over 55,000 square miles of land on which in 1900 there were 1,500,000 Horses, 3,000,000 Cattle, and 1,000,000 Sheep. This would give us 10 head of stock to the square mile. Yet no one can pretend that the Cattle, as seen from the train window, are at all equal in numbers to the Antelope as they were to be seen from the Union Pacific trains; the Antelope seemed at least twice as numerous.

From these various facts, it will be seen that in many regions, the species probably exceeded 20 to the square mile. Although there were vast areas which fell far below this, these were offset by the greater density elsewhere.

Discarding the high estimates already arrived at, this would, nevertheless, make the 20,000,000 given in my "Life Histories," a very low—a far too low—estimate. My impression is that they were nearly as numerous as the Buffalo. G. B. Grinnell has told me personally that he considers that the Antelope exceeded the Buffalo in normal times; that is, they might easily have totalled 40,000,000 about the year 1800.

"In view of the greater territory occupied by the Pronghorn, and its known abundance," says Nelson, "it may be considered a conservative estimate to place its probable original numbers at not less than 30,000,000 to 40,000,000, and possibly more."[38]

Numbers To-day

The accompanying map shows a surprisingly slight shrinkage in the range of the species—a shrinkage which, unfortunately, does not correspond with the actual reduction of its numbers.

[38] Pronghorn, pp. 3–4.

According to Dr. T. S. Palmer, "The Biological Survey published an estimate for the year 1908, based on the best figures then obtainable, showing a total of 17,000 in the United States, or, adding those in Canada, a total of less than 20,000 north of Mexico."[39]

This was probably the low-ebb time. For we know now that there are over 30,000 north of Mexico; and although dwindling on the open plains, they are slowly but steadily increasing, thanks to the Parks and Refuges.

Dr. E. W. Nelson's Bulletin on this animal gives in full the literal facts on its numbers and distribution in 1922–24. I reproduce the table:

Distribution of Antelope in North America, 1922–1924

Region	Areas	Number of antelope	Region	Areas	Number of antelope
Arizona	18	651	Canada:		
California	6	1,057	Alberta	5	1,030
Colorado	28	1,233	Saskatchewan	9	297
Idaho	14	1,485	Total, Canada	14	1,327
Kansas	1	8	Mexico:		
Montana	44	3,027	Coahuila*	1	600
Nebraska	10	187	Chihuahua*	1	700
Nevada	11	4,253	Durango		(?)
New Mexico	31	1,682	Sonora	4	595
North Dakota	5	225	Lower California*	2	500
Oklahoma	2	23	Total, Mexico	8	*2,395
Oregon	4	2,039	Summary:		
South Dakota	11	680	United States	264	26,604
Texas	42	2,407	Canada	14	1,327
Utah	10	670	Mexico	8	*2,395
Wyoming	27	6,977			
Total, United States	264	26,604	Grand total	286	30,326

*Estimated.

Joseph J. Hall, of Denver, a leader in conservation and an expert on Antelope, writes me that, in his opinion, the Antelope bands in Colorado are, in some cases, holding their own, but in the aggregate they are decreasing. In considering the whole country, he says: "The figures furnished by the Biological Survey are much too high. I spent a great deal of time about a year ago, attempting to collect these figures, and at that time, I put the number in the United States at 15,000. I talked with Director J. D. Figgins, of the Colorado Museum of Natural History, this morning, and he put it at 13,000 in the United States."[40]

[39]Progress of Game Protection in 1908, Yearbook, U. S. Dept. Agri., 1908, p. 582, pub., 1909.

[40]Letter, March 23, 1926.

The Nemiskam Park

There are a number of Antelope Preserves in America. It may be said that, as a whole, the large areas are succeeding and the small ones failing. By far the most successful is the Nemiskam National Park in southeastern Alberta.

In 1914, it was my privilege to be one of a committee of two to select 3 or 4 tracts of land as possible Antelope preserves. The other member was Maxwell Graham of the Wild Life Department at Ottawa. We visited personally and selected 5 considerable areas in southern Saskatchewan, Alberta, and Manitoba. In the last case, it was the Carberry Sandhills.

Having set apart three of these tracts, several attempts were made to secure herds of Antelope for stocking, by driving them into a corral with chutes. These efforts utterly failed. Then it was remembered that on the southeast Alberta tract was a herd of Antelope permanently located. It was their choice home land.

"The tract they were feeding on comprised approximately 5,000 acres, and was already partly surrounded by a good post and barb-wire fence. With all possible speed and caution, the barb-wire was replaced by a higher fence of woven wire, and the Antelope were successfully and securely confined by a fence that was both Antelope- and Coyote-proof. The work was accomplished without disturbing the animals, and 42 of them were captured in this area of their own selection.

"The reserve thus established was named Nemiskam National Park in 1922, and it contains all vegetation peculiar and necessary to the Antelope diet as well as an abundant water supply. It is situated a short distance from the town of Foremost, and the supervision of the herd is in the hands of a resident caretaker."

Complete protection from poachers and starvation, and very nearly complete immunity from the inroads of predatory animals and birds, have made of this Refuge a most encouraging success. There has been a steady increase, and the 42 of 1915 had become 180 in 1923; in 1925 they had, by natural increase, become 235 Antelope.[41]

The Prong Horns

The horns are perhaps the most remarkable feature of this remarkable animal. Though true horns like those of a Cow or Goat, they are yet branched in shape, and shed each year like the antlers of a Deer. This last fact was first announced by Rufus B. Sage, who wrote, about 1841, of the

[41]Nat. Res. Canada, Mar., 1925, Dept. Interior, Ottawa.

PLATE LXII.—ANTELOPE APPROACHING TO ATTACK
From a photograph by Mrs. G. G. Seton

PLATE LXIII.—HEADS OF YOUNG BUCKS

Antelope:[42] "The male, however, is equipped with hook-shaped antlers, ebony-coloured, and 6 or 8 inches in length, which he sheds annually in the months of November and December."

Dr. C. A. Canfield, of Monterey, Calif., made the discovery independently in 1858.[43]

Judge Caton investigated[44] the growth of horns in detail. His observations show that the male Antelope has, at birth, a little bump over each eye. At 4 months old (that is, at the end of September) this breaks through the skin as a small and somewhat movable horn. In January, usually when about an inch long, this is dropped, or pushed off by the new horn growing below it. This begins on the top of the bony core, which also grows rapidly, so that in a couple of months the whole horn is about 3 inches long. The next year, the shedding takes place earlier, but the bony core (now much bigger, of course) remains. The prong is developed above the bony core.

Old bucks shed in October, that is, immediately after the rut. They have an advantage over members of the Deer tribe in one particular—a Deer is hornless for some time after shedding the antler, but an Antelope's new horn is already well sprouted before the old one is dropped. The outlines shown in the Plate may be considered as diagrammatic expression of the horn development. Actual horns in series like those of the Wapiti (Plate II) are not at hand.

It is well known that true horn is theoretically a mass of consolidated hairs; but in the horn of this unique animal is visibly demonstrated the whole process,—the growth of the hair, the consolidation into horn, and the actual shedding, as with the hair of the coat.

It seems that the larger and lustier the individual, the sooner his weapons are shed. W. R. McFadden, of Denver, tells me that, early in the fall of 1894, while shooting on the Elkhead River of Colorado, he fired at a buck Antelope that had unusually large, fine horns. It ran some 20 yards, and fell dead. On coming up, he was disappointed to find that it had for horns only a pair of miserable little spikes. The puzzle was explained when he found both of its other horns, a large pair, lying on the ground where it fell. Evidently it had been at the point of shedding these when shot.

M. P. Skinner supplies the following details of the dates at which the Antelope shed their horns:

"Season of 1917–18: Nov. 15 to Dec. 2; season of 1919–20: Oct. 20 to Nov. 25; season of 1920–21: Oct. 31 to Nov. 28.

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[42]Rocky Mt. Life, 1857, p. 56.

[43]Pub. in Proc. Smith. Inst., 1866. See Caton, Ant. & Deer, p. 26.

[44]As above, pp. 25–35.

"It is quite usual for the 'old-timers' to say that early shedding is a sign of an early spring. But such does not seem to be the case. It would appear that the condition of the animals is the main factor; and since the healthy condition of the animals on the open range is largely dependent on the forage, it would seem that the comparative dates of horn shedding are more or less directly connected with the growth and condition of vegetation during the summer preceding the shedding season."[45]

In an article by G. B. Grinnell[46] it is clearly shown that the dropped horns disintegrate in about a year; which explains why so few were ever found on the Plains.

The female yearling shows little points of horn. These never exceed 2 or 3 inches in length.

Horns of the normal type are shown in the first figure of Plate LXI; and the number of variations from this is small.

Record Horns

In Rowland Ward's "Book of Records,"[47] the longest horns of this species given are the property of the Booth Co., Los Angeles, Calif. They measure: Length, 20$\frac{11}{16}$ in.; girth, 8$\frac{1}{2}$ in.; tip to tip, 19$\frac{3}{4}$ in.

Next is the Wilson Potter head: Length, 20$\frac{7}{16}$ in.; girth, 7$\frac{1}{3}$ in.; tip to tip, 5$\frac{1}{2}$ in.

Third is Dr. H. M. Beck's specimen: Length, 20 in.; girth, 8$\frac{1}{2}$ in.; tip to tip, 10$\frac{3}{4}$ in.

Closely following this are the J. Whitaker head with length of 17$\frac{1}{4}$ in.; the J. G. Millais head, 17 in.; the J. C. Phillips head, 16$\frac{1}{8}$ in.

For long, the record was held by a pair in the possession of E. S. Dodge, of Arcadia Ranch, Ariz., who shot the buck near Oracle, Ariz., Oct. 22, 1897. The measurements are given as follows:[48]

Length of left horn around curve	17$\frac{1}{4}$ in.
" " right " " "	17$\frac{3}{8}$ "
Spread of horns at tip " "	6$\frac{1}{2}$ "
Spread at widest part	15 "
Girth of left horn at base	6$\frac{1}{2}$ "
" " right " " "	6$\frac{1}{4}$ "
" " horn at largest place	10$\frac{1}{2}$ "

[45] Journ. Mamm., Aug., 1921, pp. 172–73.
[46] Journ. Mamm., May, 1921, pp. 116–17.
[47] 1922 ed., pp. 107–08.
[48] Recreation, Oct., 1898, p. 307.

All of the foregoing are owners' measurements. Rowland Ward gives his own measurements of the following:

The St. George Littledale head from Wyoming: Length, 15¾ in.; girth, 6¼ in.; tip to tip, 5⅞ in. The P. B. Vander Byl head also from Wyoming: Length, 15¾ in.; girth, 6¼ in.; tip to tip, 8¾ in. Also 6 other heads of 15-in. length of horn or upward, and 8 that are between 14 and 15 in. Anything over 14 in. is considered first class.

Freak Horns

The only "freak" type that is often seen is that known as the "droopers." An example is shown in Plate LXX. Such disfigurements are probably the result of accident in early life. But obviously, the buck with "droopers" once will always have them, as the fundamental horn cores themselves are abnormal.

W. H. R., of Laramie, Wyo., says of the specimen whose "droopers" are figured: "This animal was killed on a high, dry ridge, between the two Laramie rivers, about 12 miles from the town of Laramie, Wyo., some 4 years ago.

"The attention of hunters was first called to the animal by his walking backward, in a half circle, when feeding. He was very wild and avoided death for many months, although being continuously hunted. More than 100 shots were fired at him before he met his death. He was fat and in fine condition when killed. Examination discloses the fact that on account of the peculiar shape and length of his drooping horns he could not feed satisfactorily while walking forward, so he walked backward in order to reach the grass."[49]

Grinnell records a pair that were crossed in front of the face. (Plate LXX.)[50] He also says: "On one occasion in North Park, Colo., I killed a buck Antelope with four horns, the additional ones being solid cylindrical black masses of aglutinated hair, like the ordinary horn sheath growing from the skin of the head behind the horns. Of course, they had no horn cores. One of these horns was an inch in diameter, and about 2½ inches long, while the other was slightly longer. I attempted to preserve the skull and skin of this head, but it was lost off a pack."[51]

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[49] Recreation, June, 1897, p. 426.
[50] Forest & Stream, Aug. 13, 1910, p. 252.
[51] Forest & Stream, July 14, 1906, p. 50.

Why the Prong?

Long ago, Darwin confessed himself puzzled[52] by the form of the Springbok's horn, inasmuch as the incurve of the points apparently rendered them useless for attack. It seems as though a simple straight spike would be much more effective. The incurved point and its halfway snag seem like buttons on the rapier, like efforts to disarm the well-armed knight while leaving him in possession of his weapons. But many observations made on the Antelope in the Washington Zoo, while I was painting their portraits, showed me how true it is that not the smallest detail in nature is without distinct purpose, for which it has been carefully adapted through ages of experiment. I learned that the prong—so far from being a button on the rapier—is a hilt that protects the bare flesh farther up, as described later. In short, the recurved point enables the buck to strike his adversary in the throat, where the skin is thinnest.

The Heliograph

The bristling mane of the species is erected under excitement, and no doubt serves as a means of expression and communication. But a much more remarkable detail of the Antelope's anatomy is the white area on each buttock. This seems at first like the rest of his spots—a mere patch of white coat; but it is found to be specialized for an important service. It is composed of hair graded from short in the centre, to long at the front edges. Under the skin of the part is a circular muscle by means of which the hair can, in a moment, be raised and spread radially into two great blooming twin chrysanthemums, more or less flattened at the centre. When this is done in the bright sunlight, they shine like tin pans, giving flashes of light that can be seen farther than the animal itself, affording a conspicuous identification mark that must be of great service to the species.

Many years ago, while riding across the upland prairies of the Yellowstone, I noticed certain white specks in the far distance. They showed and disappeared several times, and began moving southward. Then, in another direction, I discovered other white flecks, which also seemed to flash and disappear. A glass showed them to be Antelope, but without wholly explaining the flashing or the moving, which ultimately united the two bands.

I made a note of the fact, but did not understand it until the opportunity came to study Antelope in the Washington Zoo. I had been quietly watching the grazing herd on the hillside for some time; in fact, I was sketch-

[52]Descent of Man, 1871, II, p. 239.

ing, which affords an admirable opportunity for watching animals a long time minutely. I was so quiet that they seemed to have forgotten me, when, contrary to rules, a Dog chanced into the park.

The wild Antelope has a habit of raising its head every few minutes while grazing, in order to keep a sharp lookout for danger; and these captives maintained the tradition of their race. The first that did so saw the Dog. It uttered no sound, but gazed at the wolfish-looking intruder; and all the long white hairs of the rump-patch were raised with a jerk that made the patch flash in the sun. Each grazing Antelope saw the flash, repeated it instantly, and raised its head to gaze in the direction toward which the first was looking. At the same time, I noticed on the wind a peculiar musky smell—a smell that certainly came from the Antelope—and was no doubt an additional warning.

Some time later, I had the chance to make a careful dissection of the Antelope's rump-patch; and the keystone to the arch of facts was supplied. My specimen, taken in Jackson Hole, was a male under 6 months old, so that all the proportions, and indeed the characteristic details, were much less developed than in the adult. (See Plate LXX.)

The fresh skin was laid flat on a board, and then the pattern and mechanism of the rump-patch were clearly seen. The hairs at the upper part of the patch (a) were about 4 inches long, grading to the centre (b) and the lower parts, where they were under 2 inches long; all snowy white and normally lying down flat, pointing toward the rear. At the point (b) among the roots of the hair, was a gland secreting a fluid having a strong musky smell. On the under side of the skin was a broad sheet of muscular fibres, which were thickest around b; they have power to change the direction of the hair, so that all below b stand out, and all above are directed forward.

It seems, therefore, that as soon as an Antelope sees some strange persons or threatening object, this muscle acts; and the rump-patch is instantly changed into a great double disk of white that shines afar like a patch of snow. Further, in the middle of each disk is exposed a brown spot (the musk-gland), from which a quantity of the musk odour is set free; and its message is read by those who have noses to read.

Of all animals, man has the poorest nose. He has virtually lost the sense of smell, while, among the animals next in the scale, scent is their best faculty. Yet even man can distinguish this danger-scent for 20 or 30 yards down the wind, and there is every reason to believe that another Antelope can detect it a mile away.

Observations on captive animals have thus afforded the key to those

made on the Plains. I know now that the flashing flecks seen on the Yellowstone uplands were the interchanging signals of the two bands, the smaller of which, on getting the musky message, "Friends," had laid aside their fears and joined their kindred. This, it will be seen, is simply a heliograph. Man flatters himself that he was the first inventor of flash communication; but he is wrong—the Antelope used it thousands of generations before it was dreamed of by mankind.

The Smell Glands

Many animals are furnished with glands that produce a strong-smelling stuff that answers in some cases as a defense, but mostly as a method of intercommunication. A Peccary has a scent-gland on its back; a Deer has one in each foot and on the hock; a Goat has several about the head. The Antelope has every one of these various smellers, each tainting the adjoining air in a way of its own, and doubtless for a purpose that none other could serve.

There are numerous theories as to the purpose of the glandular system. Judge Caton thinks that these many pungent odours help to protect the Antelope from flies and mosquitoes; but it seems more likely that their chief use is for intercommunication.

The glands on the jaw seem related to the sexual system, as they are largest in the buck and most active in rutting time; those on the rump, as seen, have a place in the heliographic apparatus; and the purpose of the others, though not yet understood, is almost certainly to serve in conveying the news.

How can they do so? As possible answer to this, rather than as ascertained fact, I suggest that an Antelope passes along a certain plain, eating at one place, drinking at another, lying down in a third, being pursued by a Wolf for half a mile. The Wolf gives up the unequal race, and the Antelope escapes at his ease. A second Antelope comes along. For him, the foot-scent from the interdigital glands marks the course taken by his fellow, as clearly as the track in the snow would do for us. Its strength tells him somewhat of the time elapsed since it was made; and its individuality shows whether his predecessor was a stranger or a personal friend, just as surely as a Dog can tell his master's track. Again, the hock-scent exuded on the plants or ground where the first animal lay down, informs the second one of the action. At the place where the Wolf was sighted, the sudden diffusion of the rump-musk on the surrounding sagebrush will be perceptible to the newcomer for hours afterward; and the cause of it will be made clear

when the Wolf trail is detected. This may sound a far-fetched tale of Sherlock Holmes among the Beasts. But not so, if we remember that in these animals, their sight faculty is at least as good as ours; that their scent faculty is of still greater value to them, and finally, if all this had been recorded in the snow, we also could have read it with absolute precision.

The uniform of the species is itself an important means of intercommunication. Its conspicuous colouring labels the creature afar as surely an Antelope, for information of friend and foe. Thus the one realizes that it is useless to follow, and the other that it is needless to flee.

It is interesting to note that the Antelope's tail does not count in its code of expression, although, in the Whitetailed Deer—which is not furnished with the discograph—the tail is greatly developed and specialized as a means of communication. Parallel cases are the Wapiti, whose tail is inert, but whose crupper-patch is very active; and the Moose, whose tail is a dummy, or sleeping member of the firm, but whose hip on each side is furnished with an erectile patch that seems to serve the purpose of expression.

As noted elsewhere in this volume, other animals that have highly developed musk-glands, have reduced the tail to a minimum; for example, Muskox, Musk-deer, and Musk-hog.

Gait

Concerning its gait, Audubon and Bachman say:[53] "Their walk is a slow and somewhat pompous gait, their trot elegant and graceful, and their gallop or 'run' light and inconceivably swift; they pass along, up or down hills or along the level plain, with the same apparent ease, while so rapidly do their legs perform their graceful movements in propelling their bodies over the ground that, like the spokes of a fast-turning wheel, we can hardly see them, but, instead, observe a gauzy or film-like appearance where they should be visible."

Like most of the Deer in this work, the Antelope has three different gaits: the trot, which is, as Audubon says, "elegant and graceful," with just a suggestion of show-off in it, as the slim-legged creature prances away with mincing steps and head held high. Second, the bouncing or bounding in air, two or three feet from the ground, rising and dropping with all four feet held rather stiffly together, much after the fashion of Mule-deer and Coast Blacktail. Sometimes these bounds are made in rapid succession before settling down to a real run. Why? Undoubtedly for the same reason that the Jackrabbit makes a "spy-hop." They are to give it

[53] Q. N. A., II, p. 198.

momentary high view, whence it can scan the surroundings and look out for danger.

Having satisfied itself as to the direction and need of departure, the Antelope proceeds to demonstrate its famous speed, like the run of the Whitetail, with head well forward, and legs outstretched in mighty, long, low bounds that eat up the dusty miles.

So swift are they that Audubon seemed to think that they could cover a mile a minute.[54]

Scorns a Common Dog

There can be no doubt that the Pronghorn is the speediest four-foot native to America—one of the fastest in the world.

I have gathered many observations on the speed of certain quadrupeds, and have arrived at a scale, which, however, I submit with much hesitation. Of course, we have no actual gauge on the speed of the wild creatures, and must reach it by various devices and comparisons, eliminating guesses. The estimates of hunters, etc., are always too high; besides, it is a misleading fact that of two animals going at the same rate, the smaller always *appears* to be going the faster.

It is safe to say that the Horse, the ancient standard of speed, still holds its own. There seems no good reason for supposing that any creature on legs—two, three, or four—ever went for any distance faster than a blood Race-horse. Salvator's mile in 1 minute and $35\frac{1}{2}$ seconds is the fastest pace reliably recorded for anything afoot.[55]

On the uplands of Mexico, in 1892 and 1893, I several times saw my hunting comrade, William Allen, on his favourite Horse, "Spider," ride into a bunch of Antelope going their best, and with everything in their favour. "Spider" was locally known as a racer, although only a quarter-blood.

On the Little Missouri, I saw some rather good greyhounds overtake a Mule-deer on the level, but fail utterly when it came to a buck Antelope. These same Dogs could catch a Coyote in a very short race.

Commenting on the relative speed of various Plains animals, Capt. R. B. Marcy says:[56] "The greyhounds have, upon several different occasions, run down and captured the Deer and the Prairie-rabbits, which are also considered very fleet, but although they have had very many races with the Antelope under favourable circumstances, yet they have never, in one instance, been able to overtake them; on the contrary, the longer the

[54] Q. N. A., II, p. 201.

[55] My authority is Samuel W. Taylor, editor of the Rider and Driver, New York; the record is Salvator, 4,110, Monmouth Park, N. J., U. S. A., Aug. 28, 1890.

[56] Expl. Red River, 1854, p. 62.

PLATE LXIV.—LEAVING THE GREYHOUNDS BEHIND
Drawing originally published in *Recreation*

chase has continued the greater has been the distance between them. The *Cervus virginianus* (our Red-deer) has generally been considered the fleetest animal upon the continent after the Horse, but the *Antilocapra americana*, or Pronghorned Antelope of the Plains, is very much swifter."

As an experience with ordinary greyhounds, there is in *Forest & Stream* for Sept. 8, 1906 (pp. 375–76), a long and illuminating article on "Antelope Coursing." The writer says:

"The greyhound depends solely upon his speed and eyesight to catch an animal; and if the pursued animal gets over a swell, or into a draw out of his sight for a short time, he will find it again only by chance, having no scent or ability to trail. His forte in overtaking game lies in his wonderful burst of speed at the commencement of the chase. He has comparatively little bottom, and if his quarry is not overtaken in the first two or three miles, the chances are that it will escape. The greatest difficulty in chasing Antelope with the greyhound is to get a fair start, which is next to impossible, because the hunter is usually perceived at a distance.

"From a half mile to a mile is as close as they will permit one to approach before running; often not that near. The difficulty in overtaking them even with the greyhound, when they have a start of a mile, will readily be perceived.

"Their bottom fully equals their speed. From the chases we had, we were led to believe that they are capable of maintaining great speed for 10 miles or more. This is something no greyhound we have seen can do; so that if you cannot approach them closely, say, within one or two hundred yards, before detection, your chances of outrunning them are poor; at least this was our experience."

He then gives details of a long hunt, about 20 miles, in which they were able to chase the Antelope in 4 relays; for the Antelope, as usual, ran in a circle 8 or 10 miles across—that is, around the home region. The event proved a disastrous defeat for hunter and Dogs, though the Antelope coursed were 2 kids.

Outrun by Thoroughbreds

Joseph J. Hall, of Denver, points out, however, that all of these greyhound defeats were in the days when only ordinary or second-class hounds were used in the match. It was quite different when thoroughbreds and high-class greyhounds were brought on the field. Indeed, he says: "In my opinion, a good greyhound can catch the average Antelope."

In confirmation of this, Dr. George B. Grinnell writes me that in 1873, "Gibbon," a phenomenal greyhound belonging to General Stanley, did on

22 occasions, in fair race, catch unwounded Antelope, some of which were bucks. And Col. W. P. Evans, 11th Inf., U. S. A., writes me, Nov. 28, 1907, that Colonel Gardiner had a bitch greyhound, which he saw catch a fine buck Antelope in 1878, near Fort Dodge, Kan. She had several others to her credit, but was undoubtedly a very unusual hound. As Governor St. John, of Kansas, said to Buffalo Jones after much experience, "It takes a mighty good greyhound to catch a mighty poor Antelope."[57]

M. E. Allison, in his article on "Coursing the Antelope with Greyhounds," tells of a remarkable hound, named Mike, who caught 3 Antelope in one day.[58] The greyhound, however, was assisted by another speedy hound, as well as by men who manœuvred the chase, and by means of a wagon, relieved the Dog of much hard travel.

But these were unusual Dogs of a rare strain, the picked and highest product of long breeding for speed. If we were in a position to pick our individual Antelope as we have picked the Dogs, I still believe the Dogs would be left far, far behind.

Measuring His Speed

F. Earle de Vore, writing on motoring after game in Colorado, says:[59] "I have timed them, and any good doe Antelope can run 43 miles an hour by speedometer measurement." This, I take it, means the rate for one mile. There is no creature on legs that could actually run 43 miles in one hour.

I have often heard railroad men tell of races between trains and Antelope. When running at the ordinary rate of 25 or 30 miles an hour, the engine could not pass these fleet coursers; but when the engineers put on all speed, so as to run at a 35-mile rate, the train forged ahead. In a mile or so, the Antelope turned aside and gave it up, disgusted to find that, at last, there was something on the plains that could outrun them.

I have computed the speed of many other animals by counting their bounds to the minute, and then afterward measuring those bounds in the snow. On others, I have made a number of comparative observations from railway trains and motor cars going at a known speed. Above all, I have always kept in mind the fact, when it is on available record, that such can catch so-and-so, in a fair race. The mineralogists make a scale of hardness on units, each of which can scratch the one below it, and be scratched by

[57] Forty Years of Adventure, 1899, p. 194.
[58] Big Game of N. A., edited by G. O. Shields, 1890, p. 340.
[59] Field & Stream, Aug., 1921, p. 298.

the one above. I have acted on this plan in making my scale of swiftness, only for "scratch" I read "catch."

In general, I have found that the wild animals are less swift than is commonly supposed, and that their strong point is the quickness with which they can get up speed. Their "muzzle velocity" is indeed a matter of life and death, for most predaceous creatures, especially the Cats, give up the chase at once if they fail on the first dash. Furthermore, I have been continually impressed by the smallness of difference in speed. The few seconds that one animal saves in making its mile is evidently of vital importance. The scale I have attempted is founded on the animal's best rate for a mile. A rate that is representative has been chosen, rather than the phenomenal or the highest record of each species.

Thus the best Horse record for a mile is at the rate of over 36 miles an hour. I prefer, however, to set the Horse at 34 miles an hour, as many Horses attain this rate.

Race-horse	Speed for a mile is at the rate of 34 miles per hr.
Pronghorned Antelope	" " " " " " " " " 32 " " "
Greyhound	" " " " " " " " " 30 " " "
Texan Jackrabbit	" " " " " " " " " 28 " " "
Common Fox	" " " " " " " " " 26 " " "
Northern Coyote	" " " " " " " " " 24 " " "
Foxhound	" " " " " " " " " 22 " " "
American Graywolf	" " " " " " " " " 20 " " "

In this connection, it is interesting to note that the best speed of a man for 100 yards is $9\frac{3}{5}$ seconds; which is at the rate of $21\frac{1}{3}$ miles an hour. A man's best speed for a mile is 4 minutes $12\frac{3}{4}$ seconds; or at the rate of 14 miles an hour. An ordinary runner makes a mile in 5 minutes (i. e., at the rate of 12 miles an hour). So that what actually counts in the race is, as usual, the *trifle more speed* that each animal can command.

Racing

The pride of the athlete is not wanting in the Antelope. Long demonstrated as the swiftest quadruped on the Plains, he lost no chance of showing other runners what real running was like; and without doubt, in those earliest days, he was in every race, and rejoiced in giving his rival "the dust" by passing in front of him.

Nelson writes:[60] "One of the most extraordinary peculiarities in the

[60] Pronghorn, pp. 6–7.

psychology of the Pronghorn is its desire to pass in front of a mounted man or a team moving by at no great distance from a band.

"From 1883 to 1888, the writer lived in a section of Arizona where Antelope were plentiful, and frequently hunted them and often saw them when riding in a wagon or on horseback along roads or trails crossing their haunts.

This area was mainly covered by a great scattered forest of pinyons, cedars, and junipers, interspersed with many small grassy parks of varying size. During the summer, Antelope were distributed in small bands in these parks, sometimes 2 or 3 individuals together and at other times from 15 to several times that number.

"It was a common occurrence when a traveller passed along these roads, for a band to stand from 75 to 200 yards away watching him. Then they would suddenly start and run one after the other parallel to the course taken by the traveller, and dash across the road immediately in front of him, often within a short distance, after which they would stream away and disappear among the scattered tree growth. When travelling on horseback, and happening upon Antelope in such places, the writer often amused himself by spurring his Horse to a gallop, and continuing his course in a direction which would take him by and away from the animals. At such times he tried to appear unconscious of their presence, and this procedure almost invariably brought the expected response, and the animals began racing him until they had gained a slight leadership, when they would dash by in front across the road or trail, one after the other, frequently the last of the lot being within 20 yards.

"Once the writer tried the experiment when he saw a solitary buck Antelope stand about 100 yards to one side of a wagon road. Appearing not to notice it, he spurred his Horse to full speed across the level plain. The buck immediately whirled and began racing him over the grassy park, gradually drawing in until it finally crossed the trail almost under the Horse's nose and certainly not more than 10 feet away, after which it dashed off and disappeared in the neighbouring scattered growth of cedars.

"On another occasion, after a long hunt, the writer was returning to camp just as it was becoming too dark to distinguish objects at a distance. Camp was some miles away, and in order to get there quickly he was galloping his Horse down the middle of a long, narrow park in the scattered pinyon and cedar forest. He was paying no attention to anything except what lay immediately in front, until a curious sound at his right caused him to look, and there he made out the dim forms of a band of about 20 Antelope which, in a long line about 30 yards away, were racing him down the park. Eventually they gained sufficient headway to cross his course a short dis-

tance in front, when they disappeared. It was so dark at the time that their forms could be only dimly seen."

Jumping Power

All travellers and hunters agree that the Antelope can cover an astounding distance in a single leap; but none of them tell us what they mean by "astounding"—whether 15 feet or 50; and this still remains to be ascertained. Judge Caton[61] was of the opinion that their leaping power is almost restricted to the horizontal. They are so essentially creatures of the open plains, and so unaccustomed to high jumping, that a 4-foot fence was found enough to confine them. This, however, only proves that his experience was limited, and the Antelope he handled were unsophisticated. For fences throughout the West have developed new habits in several species.

Thus, H. P. C., writing from Denver, Colo., Feb. 22, 1910, says that two years previously, while they were after Coyotes, they came upon a large buck Antelope. "The Dogs rushed forward to attack it, and it easily cleared a 5-strand wire fence."[62]

Joseph J. Hall, of Denver, writes: "High jumping is one of the arts that Antelope have not mastered. Although I once witnessed a band of 4 clear a 3-wire fence, I am satisfied that this particular case was the exception; and by examination, I found that the wires were quite low, and closer together than usual. This is, indeed, the only case I know of where Antelope went over a 3-wire fence. Usually, they double up their legs and shoot through between the two upper wires. Their skill in this performance is remarkable. Harold J. Cook, of Agate, Nebraska, who is not only an authority on Antelope, but a careful scientist, corroborates this in every particular."[63]

There are, however, many observations to show that once the Antelope gets accustomed to fences, its marvellous agility is properly applied, and it leaps like a Deer.

There was a time also when the Antelope had no notion of crawling through a wire fence. Thus, in 1907, on May 7th, between Kinnivie and Gleichen, Alta., I saw 26 bands of Antelope (a total of 232) lodged against the new wire fence of the C. P. R. The fence was of three wires only, yet the Antelope knew not how to pass it. They were then moving north. All I saw were on the south side of the fence.

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[61]Ant. & Deer, pp. 47–48.
[62]Forest & Stream, March 5, 1910, p. 372.
[63]Letter, March 23, 1926.

Since then, they have become expert both at crawling through and leaping over. Enos A. Mills describes some Antelope that had strayed into the forest, "hurdling fallen trees as readily as any Deer or Mountain Sheep that I have ever seen."[64] And the Antelope whose capture is narrated by Brunner[65] escaped by leaping over a 5-foot fence.

His Remarkable Feet

The Prongbuck is the only horned ruminant in North America that has but two hoofs on each foot. According to Prince Maximilian,[66] "a trace of one (never two together) of these false hoofs is sometimes seen in the fore feet."

Nature's economic plan has been to remove all parts that cease to be of use, and so save the expense of growing and maintaining them. Thus, man is losing his back or wisdom teeth, since civilized diet is rendering them superfluous.

Ancestors of the Antelope had four hoofs to the foot, like the Deer or the Pig, but the back pair on each have been dropped. At an earlier period, the common ancestor of the Antelope and Deer had *five* well-developed toes on each extremity; but it seems that, while this makes an admirable foot for wading in treacherous swamps, it is, for mechanical reasons, *a slow foot;* the fewer the toes, the greater the speed. The Deer, living in swamps, could not afford to dispense with the useful little hind or mud hoofs, and retained them for bog use; although much modified from the original equal-toed type, more nearly shown in the Pig.

But the Antelope, living on the hard, dry uplands, had no use for bog-trotters, and exchanged them for a higher rate of speed; so that it now has only two toes on each foot.

The Horse family went yet farther. They shunned the very neighbourhood of swamps; all their life was spent on the firm, dry level country. Speed and sound feet were their holds on existence; and these they maintained at their highest pitch by adopting a foot with a single hoof-clad toe.

The Voice

The sound oftenest heard from the Antelope is a querulous, grunting bleat, uttered by the mother when she is calling to the kid. The adult has further a sort of shrill whistle or snort, used as an alarm; also a short

[64] Watched, p. 188.

[65] See Strange Instances later.

[66] Wagner, Suppl. Schreber, V, 1855, p. 461.

bark of curiosity. But most of their signalling is done by appeals to the eye and nose. The kid utters a bleat or squeak.

The Eye

The eye of the Antelope is of marvellous beauty and magnitude, "larger than that of any other quadruped of its size," as Caton says.[67] And there is every evidence that it is as keen as it is beautiful. This is readily understood in relation to the fact that the Antelope is a creature of the open, where its eyes are more often serviceable to it than are its ears—or even its nose; and that the majority of its signals, unlike those of woodland animals, are dependent upon vision for their success.

G. B. Grinnell says of the species: "Of all animals, it is the most keen-sighted, depending almost wholly on its eyes for protection from its enemies. Not that it cannot smell. Its nose is as good as that of any hoofed beast, and will warn it of danger if the hunter neglects the wind. But it is upon its keen eyesight that the Antelope especially depends. If the hunter has been seen, even though at a considerable distance, it is hopeless for him to attempt to approach the Antelope; for as soon as he has passed out of sight, they swiftly change their place to the top of some hill half a mile away, and watch for his reappearance."[68]

Arthur W. du Bray, discoursing on the Antelope's amazing power of vision, says:

"'Liver-eating Johnson,' guide, scout, hunter and trapper, prairie-man, Indian-fighter, thoroughly educated and equipped frontiersman at every point, graduate at the head of his class in prairie lore—withal, a long-headed, cool, and calculating man—once said to me while hunting: 'What a live Antelope don't see between dawn and dark, isn't visible from his standpoint; and while you're a-gawkin' at him through that 'ere glass to make out whether he's a rock or a Goat, he's a-countin' your cartridges and fixin's, and makin' up his mind which way he'll scoot when you disappear in the draw for to sneak on 'im—and don't you ferget it.'"[69]

In giving detailed instructions for pursuing the fourlegged bird, du Bray says: "The principal thing is to keep out of sight. Don't delude yourself with the idea that because a band is a couple of miles away, apparently feeding, and all with their heads down, none are on the lookout, and that you may ride up a little closer and then keep out of sight. That won't do; I know it to my sorrow. The chances are ten to one that they will

[67] Ant. & Deer, p. 24.
[68] When Antelope, p. 600.
[69] Big Game of N. A., 1890, p. 316.

see you long before you see them, and although they may not move at first, still they are on the *qui vive*, and if you get a close shot after having shown yourself, why, just score it down as luck."[70]

In a word, all old-timers agree that it is a physical impossibility to stalk an Antelope once he has seen you; and he certainly will see you if you are in the open within a mile of those dark beautiful orbs.

Curiosity

It is generally believed that the Antelope would have swarmed on the unfenced plains as numerous as ever but for their fatal curiosity—the one weakness that offsets the safety of their matchless speed and eagle eyesight.

In the old days of Lewis and Clark, the recognized method of "tolling" Antelope within shot was to wave a handkerchief on a stick in their plain view, the gunner himself remaining concealed; and usually, after much doubt and many circlings, the herd, urged by their uncontrollable curiosity, ventured within range.

"If," says Grinnell, "the Antelope of the old times had been satisfied with what his eyes told him about his enemies, he might have survived much longer in the prairie country; but, although depending so much on his vision for safety, he was often quite unwilling to accept the story that his eyes told him; he often wanted to come back and take another look, to make sure that it was really an enemy that he had seen; and so after having started off and gone well out of harm's way, he would stop, look again, run off a little farther, and then stop for another look, and then perhaps come galloping back toward the half-concealed object which had alarmed him; until at one of his pauses to look again, the fatal bullet cut short his life."[71]

But that was in the days of yore. When the thunder of Buffalo hoofs was replaced by the rattle of repeating rifles, a new thought came to dominate. Now "if startled by the approach of an enemy, he would race off to the top of the nearest hill, and stand there, stamping and snorting, until his fears overcame his curiosity, and led him to shift his position to some other safer point of observation."[72]

In early days, we are told by many travellers, any unusual object was enough to attract the Antelope. But in later times, they learned wisdom. On the plains of New Mexico, I never could "toll" Antelope, nor did I hear of any one in that country who had succeeded recently. In fact, the local

[70] Big Game of N. A., 1890, p. 317.
[71] When Antelope, p. 600.
[72] As above, p. 601.

PLATE LXV.—YOUNG ANTELOPE, FROM LIFE

(*Antilocapra americana* (Ord))

Sept., 1885

hunters maintained that it was "played out"—the Antelope were too wary now to be taken in.

Colonel Roosevelt makes a similar observation for the Antelope of the Little Missouri region. He says:[73] "In the old days, it was often possible to lure them toward the hunter by waving a red handkerchief to and fro on a stick, or even by lying on one's back and kicking the legs. Nowadays, however, there are very few localities indeed in which they are sufficiently unsophisticated to make it worth while trying these time-honoured tricks of the long-vanished trappers and hunters."

An exception to this is furnished by Nelson:[74]

A New Ruse

While collecting specimens in Chihuahua, Mex., some years ago, Dr. E. W. Nelson found Antelope in numbers. He greatly desired one, as it was believed to be of an undescribed race. But they were so shy that he failed for long to get one by ordinary methods. Then, remembering the old stories of the creature's curiosity, he draped himself in a white bedsheet, stuck his hatband full of long grasses, and rode forth.

"Covered with this white cloak," says Nelson, "the writer rode out on the plains until he located a band of Antelope, and when at a distance of nearly half a mile, dismounted, hobbled his Horse, and proceeded toward them in a stooping posture. Meanwhile they were standing looking fixedly at him. When he came within 500 yards he went on his hands and knees, the sheet covering him to the ground, and began moving slowly toward them. The Antelope had lined up, with a large buck standing in front. They turned several times and nervously ran a short distance and then turned and raced back to their first position, where they lined up to look at the strange object.

"The old buck of the band, which from the beginning had stood out by itself in front, began slowly walking toward him. The writer then stopped and sat with crossed legs, the cloak still hiding his person, and waited, rifle in hand, until the buck had come within 100 yards, when it became a prize for the Bureau's Scientific Collection."

Others were secured by the same stratagem and Doctor Nelson adds:

"It may be of interest to know that the specimens of Antelope secured by the use of this grotesque disguise formed the basis of Doctor Merriam's description of a new geographic race of the Pronghorn, which he named *Antilocapra americana mexicana*."

[73] Deer Family, 1903, p. 106.

[74] Pronghorn, pp. 5–6.

Food

The Antelope is a creature of the dry plains, the land of grass, cactus, and sage; and its food is, by long habit, nearly confined to these species of plants. Judge Caton could not induce his captive specimens to touch twigs, browse, or leaves. They would eat grain and fresh bread, but rejected fruit and acorns. "They are fond of common salt," he says,[75] "and should have it always by them when in parks; and if soda be mixed with it, no doubt, it would be better for them, for their native plains generally abound with crude or sulphate of sodium, and long use may make this better for them than in the form of the chloride; at least it is worth the trial by those who have pet Antelopes."

Mills says:[76] "The food of the Pronghorn is sage, grease-wood, sometimes cactus, and, on the desert broomrape. I do not recall ever seeing him eat grass."

E. R. Sans, of the Biological Survey in Nevada, captured and reared successfully some 40 young Antelope in the spring of 1924. At first they were fed on "rich cow's milk, about $\frac{2}{3}$ of a pint at a feeding, heated to a little more than the body temperature, and fed from a bottle through a nipple . . . three times a day. When the fawns were 6 weeks old, we began to feed then a little wheat (bran and middlings)." Later they ate steam-rolled oats and green food from the meadows. At 3 months, they were fond of blue grass and white clover, fresh cut. For winter diet, well-cured meadow hay and rolled oats are best. Green alfalfa is dangerous.[77]

This helpful account disposes of the idea that the Antelope do not eat grass.

They feed freely on many species of cactus; and it will be seen that these amazing flowers of the desert supply not only food, but also drink to a host of dwellers on the burning sands.

C. J. Blazier says: "They will eat most any kind of weeds. They are very fond of peppermint, smartweed and wild rose bush, and around sand dunes, there are lots of things they like that I don't know the names of."

Another authority in the same Bulletin says: "I found that they ate a good deal of sage, but that greasewood was their favourite food."[78]

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[75]Ant. & Deer, p. 42.
[76]Watched, p. 182.
[77]From Nelson's Pronghorn, pp. 19–20.
[78]Report Amer. Bison Soc., 1922–23, p. 47.

Drink

The Antelope, like the Deer and Sheep, have greatly varied habits to fit the opportunities of their wide range.

In the great rainfall region that extends from the lower Saskatchewan to Mexico east of the Rockies, it is the custom of the Antelope band to wend its way once each day during the hours of sun heat to some familiar pond, spring or stream; always at the most open part of it, and always after the utmost circumspection. For they know right well that here may be lying in wait some one of the many foes whose only offset to their speed is ambush.

Here they drink copiously.

Nevertheless, we are confronted also by the fact that Antelope, as well as Deer, are abundant and thrifty in the vast arid area that extends west of the Rockies and east of the Coast ranges from Oregon to Sonora. Large parts of this area are without water during the greater part of the year. How, then, do the Antelope live there? The answer is simple: These regions are provided with vegetation that has the power of storing up water for its own use—that can, during the few showers of winter, lay up enough moisture to carry it over the whole year; and chief among these provident plants are the great bulging cactuses. Each is a living tank charged with fluid so precious that it must perforce wear a bodyguard of poisonous bayonets to keep back the horde of wayfarers so ready to slake their thirst at the cactus's expense. In these, the Antelope finds its desert springs. T. S. Van Dyke, who first called my attention to this fact, said in conversation (1899):

"On the arid plains of Lerdo, in Mexico, where I hunted in 1884, the Deer and Antelope *do not drink*. The proof is conclusive to my mind. I know that the only water for 40 miles was a little pool less than 200 feet across, that was only a quarter of a mile from my camp. Whitetail, Mule-deer, and Antelope abounded in all that region; yet the mud on the banks never showed a sign of one coming there to drink. It seems that the fleshy leaves of the abundant cactus supply them with both food and drink."

E. H. Wuerpel, the well-known artist of St. Louis, writes me similarly, March 30, 1901:

"When I lived in Mexico, six years ago, Antelope were still abundant on the upland plains as far south as Coahuila. There is no water in the region they inhabit, but they find the cactus leaves supply enough moisture."

But what about the spines that are supposed to be the sufficient defense of these vegetable cisterns? Wuerpel writes further: "While crossing the region with oxen, we used to burn the spines off the cactus and feed it to

the Cattle; and they suffered no inconvenience for lack of water, although without it for perhaps two days at a time."

But how do the Antelope utilize them without the kindly help of the fire-maker? Some interesting light on this point has been supplied me by G. B. Winton, of Nashville, Tenn., who points out that not only cactus is eaten, but also numerous other species of desert plants that store up water in their tissues. He says:

"It is the broad nopal leaves, as the Mexicans call them, from which the spines are burned, that the Cattle may eat them in comfort. But range Cattle that eat them, 'raw so,' that they slabber and shed tears over the spines, but get them down somehow. Occasionally, the spines collect in the stomach of an ox in large densely packed balls, ultimately proving fatal. I have seen these queer mementoes of the sufferings of the poor beasts, three inches or more in diameter.

"But there are many other succulent plants besides the prickly pear, and there are many species of the *opuntia* in Mexico, not less than 100, I should think. Some of these have almost no spines on the leaves. Others have the tufts of spines so wide apart that a Goat or a Deer may insert his muzzle between, and get a good bite, though a Cow could not. Others have soft spines, especially when the leaf is new.

"But in the arid region, the soil contains so little moisture that most of the plants have to have facilities for collecting it from the air. Their leaves or stems or both are soft and spongy. Besides the *opuntia*, there is another large family of cactus, the *mammilaria-viznagas*, in Spanish, some of them the size of a fist or smaller, others as big as barrels, protected by thorns too; but not so as to make it impossible for an animal to gnaw them. This form of cactus is very abundant about San Luis Potosi, and seems to be much depended on by both wild and domestic animals as an article of food. Then there is the organ cactus in several varieties, of some of which the fruit is especially abundant and succulent. One form, kin to the giant cactus of Arizona, has a delicious little apple, *pitaya*, of which Deer especially are excessively fond.

"But besides the cactuses—and I have enumerated by no means all of them—there is the large agave family, the maguey or century plant, the soap-root (*lechuguilla*), etc., etc., and the yuccas. All contain a surprisingly large proportion of water; and while usually thorny, are not as spiny as the cactus. Deer feed extensively on *lechuguilla*, a dwarf agave, the root of which is an excellent substitute for soap. As to the fruit of many of these plants, it is to be remembered that the climate of the Mexican Plateau is so even that cactus apples, *garambuya* berries, etc., come along without much

reference to season; there being rarely a time when something of the kind is not to be had.

"In spite of all this, however, it used always to give me a sort of uncanny feeling to find the Deer and other animals, fat and contented, making their habitat in some sun-scorched range of hills so dry that it almost frightened a man to camp among them, even though he carried and very carefully hoarded a good supply of water for his own use. How do they do it?

"Well the explanation given is the only possible one—they eat moist food. For be it understood that they do not eat cactus, etc., simply for water; it is a principal article of their diet. There must be, too, something of gradual adaptation. Goats on the range in Mexico, in ordinary weather, are taken to water only twice a week. The Deer, through many generations of practice, have got to the point where they scarcely go at all; though if water is convenient, and the weather hot, they will drink."[79]

Francis C. Nicholas, writing of the animals living in rainless Sonora, says: "A prominent physician, Doctor Purdy, of Nogales, Arizona, visited the neutral zone above Tiburon Island; and, becoming impressed with the evident ability of the animals of that region to sustain life with a minimum of water, made a series of dissections, and found that, in all instances, the bladders of the animals were abnormally small. This condition, he reports, was most pronounced among the Antelopes; and it was found in most instances that the bladders were so small that they would not have held twenty drops of water."[80]

The Enemies of the Pronghorn

The worst enemies of the wild Antelope to-day are, first, repeating rifles; next, Sheep, which destroy their winter range; and, finally, deep snow. But Coyotes, Wolves, and eagles kill many, especially kids; and epidemic diseases occasionally appear.

Coyotes are to be feared chiefly when so hard pressed by hunger that they organize a hunt with a system of relays. and thus run down the quarry that is so much swifter than themselves. This is fully set forth in the Coyote Life. But they kill numbers of the little ones before they are able to follow the mother.

Gray-wolves are less destructive because less numerous. The same remark applies to eagles. Details of the winter death and of plague, also of attacks by Coyotes and eagles, are offered later.

[79]Personal letter, July 5, 1906.

[80]Forest & Stream, Jan. 17, 1914, p. 70.

It is well worth considering the part that the Buffalo played in protecting the Antelope from Coyotes and Wolves, as well as may be from weather. As we shall see, the Pronghorn commonly associates to-day with Horses and Cattle, and even flies to them for refuge. There can be little doubt that, so confiding themselves to Buffalo, would be most effectual safety; not because of the Buffalo's friendship for the Pronghorn, but because of the Buffalo's animosity to Coyote and Wolf.

The rapid disappearance of Antelope at the same time as the Buffalo, may be more than a mere coincidence.

Rufus B. Sage describes[81] the Antelope and the Buffalo wintering together in vast throngs near Pike's Peak in 1842.

The Enemy—Snow

Every observer who has discussed the subject, tells us that in the northern part of the range, the most dreaded enemy of the Antelope is deep snow—snow that robs them of their food and of their speed, and drives the Wolves and Coyotes crazy with hunger.

Grinnell writes:[82] "Sometimes in winter, during the cold wet storms, the coats of the Antelope would become covered with wet snow, which afterward froze to them; and the animals might become so chilled that they were unable to run, and could sometimes be knocked on the head with a club."

Dr. E. L. Munson, writing from Fort Assiniboine, Mont., says:[83] "Mr. Parotti has been in this country as hunter and guide for nearly 20 years. He tells me that the fearful winter of 1893, when the thermometer registered 61 degrees below in this post, killed off four fifths of the Antelope—that they starved to death by thousands on account of the deep snow. He found, after that winter, what he estimated were 900 carcasses where the Antelope had drifted into a deep ravine and evidently had no strength to get out. Before that time, Antelope were plenty through here, but that winter killed nearly all off. While they were shot by thousands, the number so destroyed was only an insignificant fraction of the total."

These were winters of unusual severity, but they came in cycles, and took a fearful toll. Charles Blazier, the Antelope expert of Brooks, Alta., says:[84]

"The last of the big herds that used to be seen, even after the Province started settling up, went south in the winter of 1906–07, the original year

[81] Rocky Mt. Life, pp. 288, 290.
[82] When Antelope, p. 600.
[83] Forest & Stream, March 27, 1897, p. 244.
[84] Daily Colonist, Victoria, Jan, 25, 1925, p. 30.

of the 'blue snow.' They started south with a blizzard behind them, and just kept going. Lots of them died on the way, and the rest never did come back in large nunbers. . . .

"You can't stop an Antelope when it gets settled on going anyplace; might as well not try. I've seen them swimming the Red Deer River by thousands in the spring, when the ice was still floating down. Most of them were drowned, and those that managed to get across were killed by half-breeds; but still they kept on trying to cross."

Again, the Bulletin of the American Game Protective Association in its issue for Nov. (?), 1921, p. 5, asserts that the previous year, one third of the Antelope in Yellowstone Park were winter-killed.

Another dreaded result of these conditions is indicated in the report on the Antelope herds in the Wind Cave Game Preserve on the National Bison Range in Montana. In fair weather, these, thanks to their speed, could scoff at the various beasts of prey. But "during severe winter storms in two seasons, the band of 64 Antelope on the Bison Range was completely destroyed by wandering predatory animals, which were able to drive them into snow drifts and kill them without difficulty. More than half the herd on the Wind Cave Refuge also was killed, partly by Coyotes and partly by Bobcats."[85]

Disease

Domesticated Antelope in parks are very subject to fatal enteritis, a consequence, no doubt, of improper food. But the wild Antelope also have visitations of deadly disorders. Concerning the most destructive of those on record, Dr. J. A. Allen says:[86]

"During the summer of 1873, a fatal epidemic raged among the Pronghorns over nearly the whole area between the Yellowstone and Missouri Rivers, destroying apparently three fourths to nine tenths of them. The greatest fatality seems to have occurred in July, judging from the size of the fawns found dead, and hence not long after we crossed this portion of the country. From the head of Heart River to the Missouri, we found their carcasses, on our return, thickly scattered along our line of march, including those of both sexes and all ages; fawns being often found lying within a few yards of their dams. On our way out, Antelopes were almost constantly in sight; but on our return, they were only rarely met with, ten dead ones being seen to each living one. The epidemic seems not to have extended beyond the Yellowstone, where they seemed more numer-

[85]Pronghorn, p. 17.

[86]Nat. Hist. Mont. & Dak., June, 1874, p. 40.

ous on our return than on our way out, and where no dead ones were observed.

"The previous year, they are reported to have ranged over this section of the country, in autumn, in very large numbers, bands of 200 or 300 being sometimes met with by the Yellowstone Expedition of 1872, on its return eastward. Four were captured by the men as the frightened animals attempted to run through the train.

"Epidemics similar to that affecting the Pronghorns are well known to occasionally affect Deer, Rabbits, and Field-mice."

Antelope and Eagle

As we shall see in the section dealing with the young, the golden eagle or war-eagle commonly preys on the kids. But it goes even farther, and at times makes successful attacks on the full-grown Pronghorns.

The first case I ever heard of was reported to me by Harry J. Wells, ranchman of Clayton, N. M. In the autumn round-up, he said, he had seen a pair of eagles attack and kill a full-grown Antelope.

Roosevelt, discussing the subject, says: "A neighbouring ranchman informs me that he was once an eye-witness to such an attack. It was a bleak day in the late winter, and he was riding home across a wide dreary plateau, when he saw two eagles worrying and pouncing on a Pronghorn—seemingly a yearling. It made a gallant fight. The eagles hovered over it with spread wings, now and then swooping down, their talons out-thrust, to strike at the head, or to try to settle on the loins. The Antelope reared and struck with hoofs and horns like a Goat; but its strength was failing rapidly, and doubtless it would have succumbed in the end had not the approach of the ranchman driven off the marauders."[87]

Another detailed case is given by L. B. Storer in his article, "A Feathered Hunter."[88] Storer was hunting in the winter of 1880 in southwestern Nebraska. He was lying in wait for a band of 8 Antelope. He says:

"The animals finally approached within 300 yards of me when they suddenly bunched and started on a run in the direction whence they had come. They ran some distance before I discovered the cause of the stampede. Then I saw, about 10 feet behind and about the same distance above them, an eagle. For half a mile he pursued them, maintaining his position perfectly, and I could not see that he varied an inch. The Antelope were just touching the high places and were getting far away; but,

[87] Wilderness Hunter, 1893, p. 71.

[88] Recreation, June, 1902, p. 413.

PLATE LXVI.—ANTELOPE IN NATIONAL ZOOLOGICAL PARK WITH DISCS CLOSED

Photograph by G. G. Seton

PLATE LXVII.—THE SAME ANTELOPE WITH DISCS HALF SPREAD

Photograph by G. G. Seton

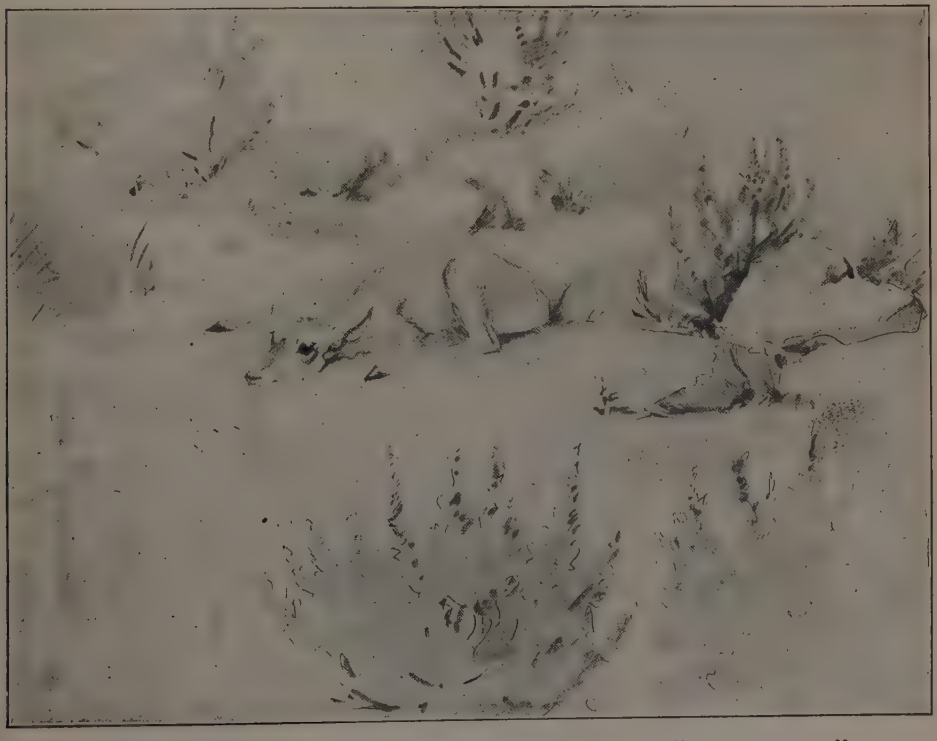

PLATE LXVIII.—SKETCH OF A YOUNG ANTELOPE "LAYING LOW"

watching them through my field glass, I saw the eagle swoop. One Antelope left the band; the great bird followed it, and for a moment both disappeared from sight. Then they emerged from the swale and started up the opposite ridge. The eagle had gained on his prey until now he was directly over the poor beast. The race was neck and neck, with the odds all in favour of the cruel bird.

"Finally he folded his wings and dropped like a chunk of lead on the Antelope's neck. The latter fell, apparently stunned by the blow. Then there was a struggle, during which the terror-stricken quarry several times rose to its feet; but the bird's talons were sunk deep in its neck and the life blood was flowing rapidly. The great bird pounded the Antelope with his mighty wings, and apparently blinded it."

Mating

The ideal family gathering is broken up at length, not by any outside enemy, but by the annual mating (one cannot call it pairing) season. Toward the end of September, the kids of the year are weaned; and about the same time, the procreative instinct is aroused in the bucks. At first the feeling is one merely of fevered unrest without definite purpose; sudden impulses drive them to expend their energies in aimless exercise. The Honourable Theodore Roosevelt writes:[89]

"Of all the game, the Prongbuck seems to me the most excitable during the rut. The males run the does much as do the bucks of the Mule and Whitetail Deer. If there are no does present, I have sometimes watched a buck run to and fro by himself. The first time I saw this, I was greatly interested, and could form no idea of what the buck was doing. He was by a creek bed in a slight depression or shallow valley, and was grazing uneasily. After a little while he suddenly started and ran just as hard as he could, off in a straight direction, nearly away from me. I thought that somehow or other he had discovered my presence; but he suddenly wheeled and came back to the original place, still running at his utmost speed. Then he halted, moved about with the white hairs on his rump outspread, and again dashed off at full speed, halted, wheeled, and came back. Two or three times he did this, and let me get up very close to him before he discovered me. I was too much interested in what he was doing to desire to shoot him."

The passion of the bucks takes very definite form when, later, the females manifest signs of response; and the battles that ensue show all the

[89] Deer Family, pp. 109–10.

savagery and greed that is characteristic of the extremely polygamous creature that the Antelope is. Canfield says[90] of his domesticated Antelope: "He was the most salacious animal I have ever seen."

"In September," says Roosevelt,[91] "sometimes not earlier than October, the big bucks begin to gather the does into harems. Each buck is then constantly on the watch to protect his harem from outsiders, and steal another doe, if he can get a chance. I have seen a comparatively young buck who had appropriated a doe, hustle her hastily out of the country as soon as he saw another Antelope in the neighbourhood, while, on the other hand, a big buck, already with a good herd of does, will do his best to appropriate any other that comes in sight."

Fighting

Roosevelt does not think these buck duels very serious affairs; but Audubon says[92] they "fight with great courage and even a degree of ferocity. . . . They strike with their horns, they wheel and bound with prodigious activity and rapidity, giving and receiving severe wounds."

In the Washington Zoo, I repeatedly saw their manner of fighting; and was made to realize how exactly each detail of the apparently harmless horn had a purpose, offensive or defensive, for which it was highly specialized. Two bucks were having one of their periodical struggles for the mastery. They approached each other with noses to the ground; and, after fencing for an opening, closed with a clash. As they thrust and parried, the purpose of the prong was clear. It served the Antelope exactly as the guard on the bowie knife or the sword serves a man; for countless thrusts that would have slipped up the horn and reached the head, were caught with admirable adroitness in this fork.

And the inturned harmless-looking points? I had to watch long before I saw how dangerous they might be when skilfully used. After several minutes of fencing, one of the bucks got under his rival's guard; and making a sudden lunge, which the other failed to catch in the fork, he brought his inturned left point to bear on the unprotected throat of his opponent, who saved himself from injury by rearing quickly, and throwing himself backward. Such a move, however, it seemed to me, could scarcely have foiled a dangerous thrust if the two animals had been fighting a deadly duel.

I find, further, that in their fights, the wild Antelope are usually struck

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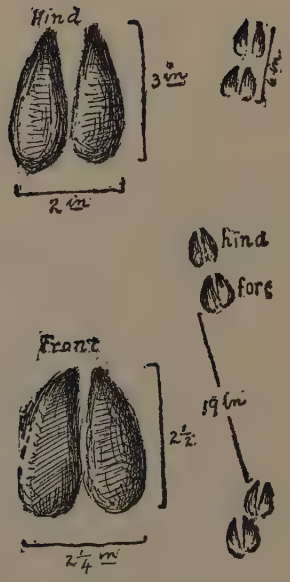
[90]Caton, Ant. & Deer. pp. 45–46.
[91]Deer Family, p. 110.
[92]Q. N. A., II, p. 197.

An Antelope pose

Antelope poses

Antelope poses



Tracks of large Antelope

PLATE LXIX.—ANTELOPE POSES AND TRACKS

in this way. W. R. McFadden tells me that on two occasions, he has seen a buck badly ripped by a rival's horn—one in the throat, the other in the side of the neck close to the throat.

The Coming of the Young

Early in the spring the usual inevitable disposition to scatter, manifests itself. The separation of the sexes seems to be due to an instinctive dislike of each other, as the time approaches for the young to be born. It becomes yet stronger as the hour draws near. At that time, each female strives to be utterly alone. She avoids even the few remaining companions of her own sex, and retires to some secluded spot.

Parturition takes place in late May or early June, on the Yellowstone, but may be earlier farther south. The fawns or kids are commonly 2 in number, rarely 3. Their mother hides them close together for several days, visiting them at frequent intervals, ceaselessly scanning air and plain for signs of danger, and never going far away, except, perhaps, when forced to seek water—a necessary absence which she cuts as short as possible.

The description of securing the kids, as given by James M. Floyd, furnishes a good idea of mother and young at this time. From the top of a butte in the Great Nevada Desert, a Federal game warden had kept daily watch on a big band of the floating white blots that stood for Antelope. Then in May, "the watcher, who for two weeks had followed the herd with his glasses, hiding here and there, knew that in a few days the does would begin dropping kids in large numbers; and twelve men were called and stationed at points along the feeding grounds where the animals assembled annually to bring forth their young.

"A truck skirted the edge of the Desert, and the driver distributed small crates to points a few miles apart; and near these, men were stationed to watch the herd day and night.

"Two days after the vigil was established, the first capture was made. Coming out from the ranks, a doe heavy in fold, approached within a few hundred yards of two men on watch. So closely did she resemble the desert that only keen eyes could perceive her. She dropped a kid, nosed the animal a moment; and there in the hot sun, he stretched out, resembling a tiny sand mound. As the mother went to another point to drop a second kid, several hundred yards away, the hunters stole from their hiding place, and keeping their eyes glued closely on the tiny sand mound, soon caught and carried off the kid, and placed him in a crate.

"Later in the day, hunters on the other side of the desert made a similar

capture. It was done noiselessly and without incident, and only one kid was taken from each mother.

"Day by day for two weeks the hunters worked, capturing sometimes two and sometimes three a day or more, and sending them to a ranch house to be fed on a bottle."[93]

Commenting on the young in Alberta, Charles Blazier says:[94] "The fawns generally come in April and May. . . . After the first fawn is born, you will see the doe turn round and 'speak' to it. Well, you'd swear that she did speak, for that little fawn just trots away and hides.

"There is no scent on the new-born animals, so when you go out with a Dog, you have to see the fawn. So well can they hide that often you will get quite close without seeing them. When they are very young, I can catch them myself. But as soon as they are a few days old, they can run and you have to put a Dog on them. The Dog is muzzled and his job is to knock them down. When they are captured, we take them back to camp and put them in a temporary corral. . . . You have to catch them within the first ten days. After that, a Dog can't keep up with them. A Dog will kill itself running after them."

The Wise Mother

Blazier continues: "But the doe is smart in looking after her young. She knows they give off no scent and she can smell any attacker. Mr. Coyote comes along and she doesn't get the least excited. She just pretends to go on grazing. She lets him get near. Then she starts running and the Coyote follows. She lets him almost catch her several times and leads him miles away. Then she gets clear of him, and circles back to where she left her young.

"She will not betray their hiding place by going to it, but goes back to feed. Every once in a while she will trot towards the fawns and they seem to know what is wanted, and one of them rises up just enough to let the doe see they are there.

"The only way a Coyote can get them in the open is by coming on one suddenly. Once the Antelope is in stride, the Coyote has no chance."[95]

The Brave Mother

From this we might infer that the mother played only the rôle of wise but timid martyr, devoted but feeble and helpless. It seems not so. At

[93]Forest & Stream, Dec., 1924, p. 745.
[94]Daily Colonist, Victoria, Jan. 25, 1925, p. 30.
[95]As above.

all times, the squeak of a kid will bring her back at reckless speed, with blazing eye and bristling hair, ready to fight to the death any ordinary foe, or (if it be one too strong to fight) to intercept and mislead him, by every device the mother wit can bring to bear. There are not many creatures native to the Plains that she will not face in such a case. As Colonel Roosevelt says:[96] "A doe will fight most gallantly for her fawn, and is an overmatch for a single Coyote; but, of course, she can do little against a large Wolf."

Audubon and Bachman say:[97] "Sometimes, however, the Wolves [Coyotes] discover and attack the young when they are too feeble to escape, and the mother then displays the most devoted courage in their defense. She rushes on them, butting and striking with her short horns, and sometimes tosses a Wolf heels over head. She also uses her fore feet, with which she deals severe blows, and if the Wolves are not in strong force or desperate with hunger, puts them to flight, and then seeks with her young a safer pasturage, or some almost inaccessible rocky hillside."

Grinnell gives us in fuller detail this very situation. He says: "It is a common thing for a Coyote to chase an old doe with her kids just after the little ones have begun to run about. At that time, they are very swift for short distances, but have not the strength to stand a long chase. In such a case, a mother will often stay behind her young, and will try to fight off the Coyote, butting him with her head and striking him with her fore feet. He pays little attention to her, except to snap at her, and keeps on after the kids.

"Several times I have seen a mother Antelope lead her little ones into the midst of a bed of cactus, where the Wolf could not go without getting his feet full of thorns. If the bed is small the Wolf will make ferocious dashes up to its border, trying to frighten the little ones so they will run out on the other side and he can start after them again, but usually the mother has no trouble in holding them. I have several times killed young Antelope whose legs had been bitten up by Coyotes, but which had got away."[98]

The Mother Antelope and the Eagle

But there is an even more dangerous enemy, because of his eyesight and his swiftness. That is the golden eagle. One of the most thrilling episodes in Antelope life is from the pen of my old friend, Howard Eaton, and deals with the attack of an eagle. He writes:

"Along in June, '94, I was out with the men gathering a bunch of

[96]Deer Family, p. 111.
[97]Q. N. A., II, p. 197.
[98]Forest & Stream, Feb. 6, 1897, p. 104.

Horses near Rainy Buttes, in the Bad Lands of North Dakota. Antelope were still plenty, and we saw many does and fawns daily.

"One evening, shortly before sunset, I saw a sight never to be forgotten. Just from habit, I had counted the Antelope we had seen that day, and up to about 6 P.M., had tallied 28. I was riding with one cowboy, and as we swung over the shoulder of a flat butte, we rode into a saucer-shaped hollow about 80 yards in diameter. I saw Antelope Number 29 across the valley, and a little higher up on the butte stood Number 30. Just then the latter spread its wings and sailed off—a big old golden eagle. Number 29 was a sure enough Antelope. She stood gazing at us until the eagle sailed near her. Then, to my surprise, she ran at him, jumped high and struck viciously with her fore leg. I had never seen such a sight before, and rode toward the spot, and watched her chase the eagle as he circled, striking at him whenever he came low. When she struck, the bird sailed higher and circled, never going far away.

"It flashed on me that the eagle wanted fawn for supper. I ran my Horse toward the fight, and when 200 yards away, a fawn raised his head above the grass. When he saw me he tried to jump up, but floundered, so I knew his back was hurt. I was within 50 yards when the eagle made a last swoop at the fawn, but the brave doe got there first, jumped at him and chased him away.

"The poor little fawn tried hard to get up and run, but his back was hurt too badly. When I picked him up, he cried like a baby, the most piteous bleat, and the doe ran to within 20 yards of us. The eagle heard the fawn cry and sailed within easy shotgun range, and the brave little mother chased him again.

"I found the claws of the eagle had lacerated the little fellow's back so wickedly, and especially just over the kidneys, that it would be well-nigh impossible to save his life. It was during the hot weather, and the kid being so young and having so little vitality, inflammation would be sure to set in. I therefore adopted the only humane remedy and put him out of his misery as quickly as possible.

"As we rode away, the poor old doe followed us nearly to the ranch. Then she stood on a hill until we entered the corral. I would gladly have restored her young to her, safe and sound if possible, and would have saved her from any such contest with possible enemies in the future if she could have trusted me; but her fear of her ancient enemy, man, would not permit her to go home with us."[99]

The menace of the eagle is tempered by the fact that eagles are few, and

[99]Recreation, Nov., 1914, pp. 278–79.

other foods abundant. But the coming of the snow somewhat changes this; and in winter, the war-bird takes his toll when easier prey is wanting.

Grinnell writes: "The golden eagles often kill them when they are quite young, although if any old ones are near they will fight the birds, keeping them from catching the young ones.

"Once in winter I saw an eagle attack two kids. They were feeding at a little distance from a large bunch of perhaps 1,000 Antelope. At this time the young ones were 7 or 8 months old, and so quite large and strong. The eagle had been sitting somewhere on the hillside, and flew down over the kids to pounce on one of them. They immediately began to run to the herd, and when the eagle made a dart at them, they both stopped, reared on the hind legs, a good deal in the position of the unicorn that we sometimes see fighting for the crown, and struck at the bird with their fore feet. Perhaps he was not very hungry, but at all events this turned him and the kids ran on. He made two more swoops at them before they reached the herd, and each time they fought him off in the same way by rearing up and striking after him. Of course, when they got in among the other Antelope, the eagle left them and flew away."[100]

The Kid Lays Low

Audubon, during his visit to the Far West in 1843, had many opportunities of observing the young after they were old enough to follow the mother. This they do, he says, when they are a fortnight old; and he describes with happy enthusiasm the nursing of a kid at this age:[101]

"We had the gratification of seeing an old female, in a flock of eight or ten Antelope, suckling its young. The little beauty performed this operation precisely in the manner of our common lambs; almost kneeling down, bending its head upward, its rump elevated, it thumped the bag of its mother from time to time, and reminded us of far distant scenes where peaceful flocks feed and repose under the safeguard of our race."

The kids, though strong enough to follow the mother, are yet ready, at her signal, to hide when danger threatens; and the marvellous way in which they "play dead" is most inspiring.

On June 13, 1897, I rode to the top of Junction Butte, in Yellowstone Park. As my head rose above the level, I caught sight of a female Antelope walking along, followed by a smaller animal, that turned out to be her kid. Very soon the mother saw me, and communicated her alarm to the young one, which dropped at once to the ground. Just how she ordered him to

[100] Forest & Stream, Feb. 6, 1897, p. 104.

[101] Q. N. A., II, p. 199.

Antelope with drooping horns

From photograph in *Recreation*, June, 1897, by W. H. R., who got them at Laramie, Wyo., in 1893

Diagram of buck Antelope's horns in his four successive autumns

The black part is the new horn coming inside

Skin of crupper-discs

At AA the hair was about 4 inches long; at and below BB less than 2 inches; at CCC, between the two patches, it was ¼ inch long

PLATE LXX.—ANTELOPE DETAILS

hide I cannot tell. I am satisfied that he did not see the danger. She may have grunted, but I am inclined to think that the danger signal was a flash of her crupper-disks. As soon as he had dropped, she ran off to one side, uttering the loud, grunting bleat of the species. Evidently, she was trying to decoy me away; but I rode straight to where the young one had disappeared, and found him crouching flat on the bare ground, and yet so well concealed by his protective colour and his stillness, that had I not marked him down, I never should have found him. I rode around him, and spent some twenty minutes making the sketch, which, finished afterward, appears herewith, Plate LXVIII. During this time, he gave no sign of life. Even a fly crawling over his eye and nose did not make him forget that his duty was to "lay low" at whatever cost.

This young one I took to be two weeks old. His colours were quite unlike those of the adult, being soft, unspotted shades of gray and brown that matched him with the ground, helping him to hide; they constituted, indeed, a *protective* colouration, in contrast to the *directive* livery of the old one—a livery which he does not assume until he is able to save himself by running.

On the preceding day, I had ridden alongside the Yellowstone, in the Park, with Elwood Hofer. Three Antelope were in sight. By imitating the squeal of a kid, Hofer brought an old one up near; and shortly afterward, we found two of the young close together. They were well-grown—much larger than the one seen the day after; yet they crouched in the sage while the mother circled 200 yards away, uttering her alarm bleat. When we got within a few feet of them, they jumped up and ran away swiftly, but crouched again when out of sight over the next ridge. I took them to be about three weeks old. In this case, the mother's alarm cry may have been the sufficient order to hide.

Mills tells thus of certain kids that he was watching: "I stumbled over a lone Antelope kid about half a mile from the other two. I returned later and found that it was entangled between the twisted low-lying limbs of a sage-brush. Not until I laid hold of the kid to drag it out did it make a move. Then it struggled and gave a low bleat.

"Realizing that this might bring the mother like lightning, I let go and rose up. There she was, coming like the wind, and only 400 or 500 feet away, indifferent to the fact that man is the most dangerous of enemies. Just how close she might have come, just what might have happened had I not straightened up at that moment, is sheer guesswork. But the freed youngster butted me violently behind and then ran off to meet his mother."[102]

[102] Watched, pp. 177–78.

It seems indeed likely that few Antelope kids are killed by their natural enemies, except such as are surprised during the brief absences of the devoted mother.

This is a danger inseparable from polygamy. If the Antelope had developed monogamy, the young would have two adults to protect them; at least one would likely be near at all times, and the superior prowess of the buck might even have eliminated the chief danger of their lives.

As soon as the young can follow—that is, at about 3 weeks old—there is a disposition on the part of the mothers to form little bands. In early July, two or three of the old ones with their kids may often be seen together. They unite for the sake of company and mutual protection; so that this is truly a social gathering.

By the end of July, the kids on the Yellowstone are about half grown, and have now assumed the livery of the old ones. Early in August, the young bucks begin to join the bands of their mothers and little brothers.

September Bright and Care-free

By September, older bucks drift in, and the Antelope band shows all ages, sizes, and sexes mingled together in a huge happy family. As this is too soon for the sexual passions to play their firebrand part, we have in this bright month of September an ideal scene that is probably unique among our horned ruminants.

Many old hunters have described it to me. W. R. McFadden, of Denver, in particular, has given me full details, including those of a game that he witnessed about the middle of Sept., 1882, in the head of Middle Park, Colo.

He had crawled out after a band of Antelope on the plain. There was a fine big buck, and only one. McFadden got out to a Buffalo wallow, and rising up to shoot, saw the buck playing with 7 or 8 kids. They were careering about, he was leading. They would chase him, and caper and prance around him. After about half an hour, the little ones got tired, and rested. But the buck was still fresh, and he set out racing by himself as though bent on using up all his surplus energies. Rushing at full gallop round and round the bushes, here and there, anywhere, to keep going, and yet close to the band, he must have run ten minutes, all alone, at full speed, while the hunter watched; and still seemed fresh as ever.

On another occasion, McFadden saw a dozen kids and two or three big bucks at play in the same way.

As September passes, the band increases, the merry games relax not;

and the good fellowship existing is exemplified when Fox or Coyote menace any of the young. Each one seems now to act for the good of the enitre herd. A mid-September incident of Antelope hunting in Jackson Hole recurs to me: I had crawled through brush and sage for half a mile after a mixed band of 40. I was within 300 yards, and in cover of a certain clump of sage. I expected to get within 100 yards, before selecting my specimen, when a loud "kau" afar to my right called my attention to the fact that I was in plain view of a young sentinel buck whose head showed above the sage 200 yards away. In an instant every crupper-disk was flashing and the band lined up. The next moment I knew they would be going. I turned my sights on the nearest—it was the sentinel—and now—he is among the specimens on view in the National Museum.

Winter Life

During the winter the Antelope live in mixed bands of all ages and sizes. Nowadays these bands are commonly 10 to 50 in number; but in earlier days, I am told, several hundred, even thousands, would run together.

And when a dread blizzard comes, it sweeps the Antelope of a thousand square miles before it, into the brake or shelter of the hills, as we have seen in an earlier section.

How Tamable

If captured when fully adult, Antelope are usually irreclaimable. But, taken when a few days old, they are the most tamable of our horned creatures.

They are, however, extremely delicate at this age, and difficult to bring up, although J. H. G. Bray, of Medicine Hat, tells me that he has had good success with them, and reared many Antelope kids by feeding them on cow's milk, one third water, and a little sugar, giving them many feedings a day.

Even when fully grown, they are not hardy, and rarely live long in confinement. Fatal enteritis seems to be the usual cause of death.

Charles Blazier, of Brooks, Alta., has had uniform success in handling these lovely fragile creatures.

Those who have opportunity, and wish to make practical use of directions to capture and raise Antelope kids, are counselled to send for Nelson's Bulletin, No. 1346, U. S. Dept. Agriculture. (See References.) In this are given in detail the successful methods followed by Supervisor E. R. Sans (pp. 18–22).

Odd Associations

It is a common remark out West that Elk and Horses go together. Cattle and Antelope show somewhat similar liking for each other's company.

A case is related later of Antelope and rams of common Sheep associating. But Cattle were their favourites ever, as in ancient days they hung on the flanks of the Buffalo, possibly to enjoy the protection from Wolves as we have seen.

Strange Happenings

Eugene A. Brunner, of Bethlehem, Pa., relates the history of an Antelope caught by hand, as follows:

"In 1877, I worked on the Sheep ranch of Eaton & Gifford, on Cedar Creek, Russell County, Kansas. The Sheep were taken out to graze miles away from the corrals; but the rams were kept separate and were herded nearer home by a young man about 18 years old whose name I do not remember. One fine day in the fall, a ram herd was in plain view about one half a mile from the cook shanty, when suddenly I heard someone yelling. I looked in the direction of the herd and saw the young man waving his coat and calling. At first I thought it was a prairie fire, but seeing no smoke, I was puzzled to know what was wrong.

"I hitched up the mules to the wagon, which was always ready for a prairie fire, with barrels half full of water and old wool sacks to fight the fire; and drove to the ram herd. When I came up to the herder, he was holding an Antelope down. He had tied its legs together, using the lining of his coat for ropes.

"This Antelope, with some others, came to the herd, and being very inquisitive, they went from one ram to the other, trying to make friends. The herder lay on the ground perfectly quiet, and presently one of the Antelopes smelled around him and he seized and held it, tore the lining of his coat to tie the legs—in which he succeeded pretty well—and then yelled for help." She escaped by jumping the 5-foot fence of the corral.[103]

The Right of Sanctuary

A range-rider, J. H. C., living at Lowry, Mont., after mentioning, to condemn severely as "a cruel shame," the practice of using an automobile to run down Antelope, relates the following:

"Recently a farmer living north of the city, was coming to town and stopped to open a gate. While he was doing so, an Antelope, hard-pressed

[103] Forest & Stream, Feb. 19, 1910, p. 293.

by an automobile, ran in between his Horses for protection and was saved by him from its pursuers."[104]

This is in line with several instances that I have seen, as set forth in the Lives of Coyote, Red-fox, Moose, Snowshoe Rabbit, etc.

J. B. Goff told me, Oct. 2, 1901, that while freighting between Rifle and Rawlins some years before, he saw two Coyotes chasing an Antelope. They worked some distance apart, keeping the Antelope running zigzag between them, so that it really did four times the running of either. At last, in utter exhaustion, it ran up to him, and cowered near the Horses for protection. He dropped his lariat on its neck—and—I am sorry to say—well, he said in justification, "I was out of meat."

I was privileged to see a similar case with even more dramatic details. It was in the October of 1898. I was riding across the Bighorn Basin, Wyo., with Mrs. Seton and A. A. Anderson, when we noticed near the horizon some bright white specks. They were moving about, appearing and disappearing. Then two of them seemed to dart erratically over the plain, keeping always an equal distance apart. Soon these left the others, and careered about like twin meteors, this way and that, then our way; at first in changing line, but later directed toward us. Their wonderful speed soon ate up the intervening mile or two, and we now saw clearly that they were Antelope, one in pursuit of the other. High over their heads a golden eagle was sailing.

On they came. The half mile shrank to a couple of hundred yards, and we saw that they were bucks—the hind one the larger—dashing straight toward us. As they yet neared, we could see the smaller one making desperate efforts to avoid the savage lunges of the big one's horns, and barely maintaining the scant six feet that were between him and his foe.

We reined up to watch, for it now was clear that the smaller buck had been defeated in battle, and was trying to save his life by flight. But his heaving flanks and gaping, dribbling mouth showed that he could not hold out much longer. Straight on he came toward us, the deadliest foes of his race, the ones he ordinarily fears the most.

He was clearly between two deaths; which should he choose? He seemed not to hesitate—the 200 yards shrank to 100, the 100 to 50—then the pursuer slackened his speed, seeing that it would be folly to come farther. The fugitive kept on until he dashed right in among our startled Horses. The eagle lighted on a rock 200 yards away.

The victorious buck veered off, shaking his sharp, black horns, and circling at a safe distance around our cavalcade to intercept his victim

[104]Forest & Stream, Jan. 9, 1909, p. 55.

when he should come out the other side. But the victim did not come out. He felt that he was saved, and he stayed with us. The other buck, seeing that he was baulked, gave up the attempt; and turning back, sailed across the plain, till he became a white speck that rejoined the other specks—no doubt the does that had caused the duel.

The vanquished buck with us stood for a time panting, lolling his tongue, and showing every sign of dire distress. It would have been easy to lasso him, but none of us had any desire to do him harm. In a very short time he regained his wind, and having seen his foe away to a safe distance, he left our company and went off in the opposite direction. The eagle, realizing now that there would be no pickings for him, rose in haste and soared away.

This incident suggests a number of psychological problems which will be hard to solve if we accept certain old-time theories of animal creation; but which will solve themselves if we admit the Antelope to be a fellow-creature, with feelings somewhat akin to our own. Had one of us been in the place of the vanquished buck, we should probably have done just as he did.

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LIFE LV—THE WHITE GOAT

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White Goat, Rocky Mountain Goat, American Chamois, Goat-Antelope, Antelope-Goat, Wool-Bearing Antelope, White Buffalo, White Antelope, The Old-Man-of-the-Mountains, Mazama

Oreamnos americanus (Blainville)

(Gr. *oreos*, of a mountain and *amnos*, a lamb; L. *americanus*, of America)

Rupicapra americana Blainville, 1816, Bull. Sci. Soc. Philomath, Paris, p. 80.

Oreamnos americanus Hollister, 1912, Proc. Biol. Soc. Wash., Dec. 24, p. 186.

Type Locality—Cascade Mts., near the Columbia River

French, *Chèvre des Montagnes Rochées.*
Chinook, *Yalakan*, (ewe); *Schulopps*, (ram) (W. N. Beach); *Snow Mowitch* or *White Deer* (Allan Brooks).

The Family *Bovidæ* comprises large animals (Cattle) of the style of the common Ox. They have hollow horns on persistent bony cores, which grow larger each year, and are never shed: 4 hoofs on each foot, the hinder 2 smaller and higher than the fore 2; feed on herbage; have no upper incisors; a complex stomach, with 4 distinct compartments; and they chew the cud.

The Mountain Goat combines, in some degree, the outward appearance of Antelope, Goat, and Sheep. The present species is the only living member of the genus.

Its nearest relatives are the Forest-goats or Goat-antelopes of Asia —namely the Serow of Japan, and the Goral of the Himalayas; also the Chamois of the European Mts. All of these, including our Goat, are placed in the Subfamily *Rupicaprinæ*.

The Genus *Oreamnos* (Rafinesque 1817) may be thus characterized: Medium-sized, with short, erect horns; a beard on chin; nose hairy; coat, thick, long and white, much obscured by the abundant white wool or underfur; tail, very short; teats, 4.

$$\text{Teeth: Inc. } \frac{0-0}{4-4}\text{; can. } \frac{0-0}{0-0}\text{; prem. } \frac{3-3}{3-3}\text{; mol. } \frac{3-3}{3-3} = 32$$

As Seen Afar. The first time I met the White Goat, was in Glacier Park; and the impression it gave me, was of a fleck of snow lodged in a cave or on a shelf of the far, sheer precipice. Very soon I saw more flecks, and noted that these flecks of snow were all nearly of one size and shape, and were faintly tinged with yellow; then it dawned on me that these were Mountain Goats. It was hard to believe that anything on four legs could get to such places, much less elect to stay there.

As I came nearer, the Goats suggested common fleecy Sheep, new-washed for the shearing. And when close enough to make them go off at their slow, ambling pace, I thought at once of a White Bear, and remembered that Captain Cook probably saw the skin, and passed it for that of a little Bear.

Size of male. Length, 60 to 70 in. (1521 to 1775 mm.); tail, 6 to 8 in. (152 to 203 mm.); hind foot, 13 to 14½ in. (330 to 368 mm.). The large ♂ collected by Jas. L. Clark on the headwaters of Tanzilla River, B. C., Sept. 9, 1925, gave total length 64 in. (1623 mm.); hind foot, 13 in. (330 mm.); height at shoulder, 39 in. (989 mm.).

A very large ♂ is recorded by Baillie-Grohman as having a length from tip of nose to root of tail of 70½ in. (1787 mm.).[1]

The ♀ are about 10 per cent. to 20 per cent. less.

Weight. The average weight of the Goat does not exceed 100 lbs. says John Fannin.[2] But it is a creature of great individual variation. Some look no larger than a Common Sheep, and others have been mistaken for an Indian pony. A large one killed by Sir Edmund G. Loder, weighed 246 lbs. as it fell.[3] Another taken by John M. Phillips in British Columbia, weighed 276 lbs.[4]; 200 lbs. is near the average weight of a billy. In *Recreation Magazine* for June, 1898 (p. 437), is an account by O. D. Hoor, of a male Goat of extraordinary strength and valour, whose dressed weight was 225 lbs., which means a live weight of about 300 lbs.

According to Col. David T. Abercrombie, the very large one killed in southeast Alaska by S. E. Howard in 1913, weighed 502 lbs. I have seen the specimen; but can say only that it is an enormous animal.

The kid born in N. Y. Zoological Park, May 20, 1908, weighed 7¼ lbs. two days after birth, and stood 13½ in. high at the shoulder.[5]

Colour. Normally, the Goat is everywhere white, sometimes stained

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[1]Hunting, p. 199.
[2]Forest & Stream, Mar. 3, 1887, p. 107.
[3]Sport & Life, p. 115.
[4]Campfires, p. 90.
[5]N. Y. Zool. Soc. Bull., July, 1908, p. 429.

yellowish about the buttocks. The horns, rims of nostrils, lips, and hoofs black; the eye, yellow in adult, dark brown in young.

The ♀ is the same in colour as the ♂.

Among the Goat skins at the American Museum, fully one third have a scattering of dark brown hairs on the rump and tail; this dark hair is coarser than the rest. One specimen, a male kid from the Cascade Mts. of Washington, has a dorsal mane of brown hair, which is fully an inch wide; not well marked on the neck; but strengthening till, on the tail, it is brown and bristly, and ends in a tuft of long, dark hairs. These brown hairs, no doubt, are relics of the ancestral coat which the climbers wore when they lived on the lower rocks, or even in the woods, as do their kinsmen the Serow and Goral in the Old World of to-day.

Races

Four forms of Mountain Goat have been listed:

americanus Blainville, the typical form. It has a broad skull, and horns very little spread. T. l., Cascade Range, near Columbia River.

kennedyi Elliott, like the above, but with widespread, much ringed horns, and hollow forehead. T. l., Mts. at mouth of Copper River, Alaska.

columbiæ Hollister, a very large form, with a long, narrow skull, T. l., Shesley Mts., northern B. C.

missoulæ Allen, the smallest of all, with a short, narrow skull, T. l., Missoula, Mont.

Horns and Record Heads

The horns of the White Goat are wonderfully effective daggers for hand-to-hand combat, but rather insignificant as trophies. Nevertheless, it is the custom to go hard after them; and if won, parade them as scalps that show how great a warrior fell to one's prowess.

An average billy's horns are about 9 in. long. The nanny's are about as long, but more slender; which implies that she needs them as much as he does, but for a slightly different purpose.

Although Goats are not quarrelsome among themselves, they show a tendency to prod each other when closely confined. The horns are so sharp and effective as weapons, that it was found well in the Bronx to saw off an inch of the tips.

Rowland Ward's "Book of Records" (1922 edition), gives the following notable heads of billies.

The Wilson Potter head of British Columbia: Length, 12½ in.; girth, 5¼ in.; tip to tip, 11½ in. (Owner's measurements.)

The F. S. Groves head from Cassiar: Length, 11⅜ in.; girth, 6 in.; tip to tip ? . (Ward's measurements.)

The Clive Phillipps-Wolley head from British Columbia: Length, 11 in.

Besides these, Ward lists 18 heads that have horns of 10 in. or more (12 of these are his own measurements), and 7 that are between 9 and 10 in.; nothing under 9⅝ in. is listed.

A total of these points allowing the average where data are missing, gives them as follows:

1st Wilson Potter head with 29¼ pts.
2d F. S. Groves head with 24¾ pts.
3d Phillipps-Wolley head with 23½ pts.

The record nanny head is owned by G. L. Harrison. It was taken in Montana and measures: Length, 11½ in.; girth, 4¾ in.; tip to tip, 6¼ in. (Owner's measurements.)

The Horn Glands

Goats are noted for the number and activity of their musk-glands. Our White Goat is not, strictly speaking, a Goat at all, but an Antelope; and his glandular outfit is very limited. He has, however, one peculiar gift in this kind—unique, so far as is known: Behind each horn is a large, black, rubbery-looking boss that is an oil-producing gland. It is found in both sexes, but is largest in the male, and is particularly large and active during the rut. Prof. H. F. Osborn says that at that time, it "freely exudes an oil which softens the back of the horn, often causing a crease, as if the result of wear."[6]

Let us remember that musk-glands serve usually as means of communication. Being most active in the rut, they become helpful in getting the sexes together. At that time, the billies slash the brush with their horns as an impressive demonstration of power. The result is that that particular brush is anointed with the wireless message of the gland; and, from excessive use, the horn itself may be abraded into a crease.

His Snowy Robe

When Mother Nature decided to create an animal that could and would be happy in the uninhabited steeples that crown the great cathedral

[6]N. Y. Zool. Soc., 10th Ann. Rep., 1906, p. 226.

of the Rockies, she selected as raw material some hoofed thing of the lower levels, blessed him with a dauntless heart, nerves of iron, limbs of steel, and a coat of warmest wool, plentifully reinforced in an abundance of long, coarse guard hairs. Then she bleached her new plaything till he was pure white, and bade him go forth to glory in the promised land, where none were disposed to envy him or question his exclusive right.

It is proof of dry, unbroken cold in his native realm that the robe, so completely resistant to wind and frost, is a poor protection against rain. In the N. Y. Zoological Park, the Goat herd has been managed with great success by Keeper Bernard McEnroe. He early learned that the creatures cannot stand rain. He shuts up the herd under cover as soon as a rainstorm begins. If they were exposed to a drenching storm for 24 hours, their coats would water-log, and the chances are that pneumonia would carry off the lot.[7]

In their native wilds, it will be seen later, the Goats have caves of refuge for bad weather.

The fleecy underwear, that has won for him the name of "the only American Woolbearer," is 3 to 4 inches long, snowy white, and fine as merino.

G. B. Grinnell says: "Specimens which I furnished some years ago to Dr. Thomas Taylor, microscopist of the Agricultural Department at Washington, were called by some wool experts fine Cashmere wool; by others, Australian fine; and by still others, fine wool from various foreign ports. Doctor Taylor pronounced the wool finer than Cashmere wool."[8]

Long ago, the natives of the Goat country learned to spin this wool, and weave it into blankets. They gathered the wool either from the bushes or from the dead Goat; and spun it on the bare thigh, with the flat left hand, while the right hand held a spindle that gathered up the thread. Then with a warp of twisted cedar bark, strung on the simplest kind of a loom, and balls of this wool dyed yellow, brown, and black with native dyes, they wove the famous Chilkat blankets—each one a symbolic record of some totemic animal—a futurist, cubist, impressionistic design, so artistic and full of worth that Chilkat blankets vie with those of the Navaho, as the most beautiful the world has seen.

His Other Contributions

Horns. There was a time when the horns were carved into beautiful spoons. But here also the Demon of Commerce has breathed his poisonous

[7] N. Y. Zool. Soc. Bull., July, 1908, p. 429.

[8] Climbing for White Goats, Out-of-Door Library, 1897, p. 114.

breath on art. So that now the carved and inlaid spoons of Chilkat are being rapidly displaced by the cheap and melancholy product of the tin-ware factories.

Meat. How gladly would I spread the idea that the flesh of the Mountain Goat is rank poison. I would disseminate the same thought about the Bighorn and Antelope if I could. The fact is that, as soon as a large animal has proven good for human food, it attracts the attention of the aforesaid Demon, and its doom as a wild thing is sealed.

Most observers agree that the flesh of the Goat is tough, hard, and dry; also characterless, except in the case of the old ones, in which it has too much character; and is so strongly flavoured with musk that the latter end of an onion-fed Pole-cat would be chicken-breast in comparison. This aromatic exuberance reaches its climax in old billies during the season of the rut.

Some, however, maintain that the flesh of the nannies and kids is sweet and wholesome, provided that the creature found sudden death in a lawful manner during the lawful season; that is, by rifle, in the autumn. Most meat, indeed, is rendered poisonous if the animal dies fighting and furious, after a long pursuit, and a battle with Dogs or hunters.

History

The earliest recorded hint of this creature's existence is found in Captain James Cook's account of his Voyage around the World. In 1778, he visited British Columbia and Alaska; and in his log, makes several observations on the spun woollen garments of the natives. On May 20, 1778, when in Prince William Sound, he wrote (p. 393): "Besides these animals, there is here the White Bear of whose skins the natives brought several pieces and some complete skins of cubs." The Polar Bear is not found within a thousand miles travel of this place; and Kermode's Bear is equally remote; whereas the White Goat is common in the mountains about the Sound. Therefore it is probable that Cook was unwittingly writing of the Mountain Goat.

The following paragraph from Pennant[9] certainly refers to none other species, although he has confused the Bighorn and the Goat in parts of the account:

"I dare not pronounce that they [the Sheep] extend to the continent of America; yet I have received from Dr. Pallas a fringe of very fine twisted wool, which had ornamented a dress from the isle of Kadjak; and I have

[9]Arctic Zoology, 1784, I, p. 12.

myself another piece from the habit of the Americans in latitude 50°. The first was of a snowy whiteness, and of unparalleled fineness; the other as fine, but of a pale brown colour; the first appeared to be the wool which grows intermixed with the hairs of the Argali; the last, that which is found beneath those of the Musk Ox. Each of these animals may exist on that side of the continent, notwithstanding they might have not fallen within the reach of the navigators in their short stay off the coast."

In July, 1789, when at the mouth of the Mackenzie River, among the Hare Indians, Alexander Mackenzie wrote: "Reindeer, Bears, Wolverines, Martens, Foxes, Hares, and White Buffaloes are the only quadrupeds in their country; and that the latter were only to be found in the mountains to the Westward."[10] Reference to the map shows that these White Buffaloes might be either White Goats, or, as Richardson supposes, White Sheep. A consideration of their appearance makes it seem likely that White Goats were meant; especially as they have been called White Buffalo by several observers.

On the other hand, the White Sheep range very near to the Mackenzie River mouth, and the White Goats not within 500 miles.

In 1795, according to Richardson[11]: "Vancouver brought home a mutilated skin which he obtained on the northwest coast of America"; although Vancouver does not mention the fact in his own account of the voyage.

In 1805, Von Langsdorff was at Kodiak Island, and there saw the wool of the White Goat. He writes: "The Overseer Bander shewed me the wool of a wild American Sheep, which was whitish, fine, and very long, and is much used by the natives of the north-west coast of America for clothing and carpets. I never could obtain a sight of the animal that produced this wool; it must, however, be very different from the Argali, or Wild Sheep, *Ovis ammon*, for this has a sort of hairy coat, more like the Rein-deer, and nothing like wool. I do not know that any seaman or naturalist has described or mentions having seen the American wool-bearing animal in question."[12]

In the early part of their famous journey, Lewis and Clark refer to the Pronghorn Antelope as the "Goat." Later, they transfer the name "Rocky Mountain Goat" to the "Bighorn." On Oct. 30, 1805, when on the Columbia above Crusatte's River, they wrote: "We here saw the skin of a Mountain Sheep, which they say lives among the rocks on the mountains; the skin was covered with white hair, the wool long, thick and coarse, with long,

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[10]Voyages from Montreal, 1801, p. 76.

[11]F. B. A., I, p. 268.

[12]Voyages and Travels, G. H. von Langsdorff, 1814, p. 75.

PLATE LXXI.—MOUNTAIN GOATS AT HOME

Drawing by E. T. Seton, 1898
Loaned by the New York Zoological Society

coarse hair on the top of the neck and the back resembling somewhat the bristles of a Goat."[13]

On page 180, they amplify the description by stating that the natives manufacture blankets from the wool, and that according to the Indians, the creature has "erect, pointed horns."

But the entry which is usually considered the basis of the scientific description and name, was made April 10, 1806, when they were in the Cascade Mountains. It reads as follows:

"While we were at breakfast, one of the Indians offered us two Sheep-skins for sale—one, which was the skin of a full-grown Sheep, was as large as that of a common Deer; the second was smaller, and the skin of the head, with the horns remaining, was made into a cap, and highly prized as an ornament by the owner. He, however, sold the cap to us for a knife, and the rest of the skin for those of two Elk; but as they observed our anxiety to purchase the other skin, they would not accept the same price for it; and as we hoped to procure more in the neighbourhood, we did not offer a greater. The horns of the animal were black, smooth and erect; and they rise from the middle of the forehead a little above the eyes, in a cylindrical form, to the height of four inches, where they are pointed. The Clahclellahs informed us that the Sheep are very abundant on the heights and among the cliffs of the adjacent mountains; and that these two had been lately killed out of a herd of 36, at no great distance from the village."[14]

The first white man to see with his own eyes and describe on paper the White Goat was the intrepid Alexander Henry. On Feb. 9, 1811, he was at Kootenay Park on the Great Divide, near the National Boundary, and wrote: "Des Jarlaix, my hunter, I left behind to kill a White Goat, as it is here they are most numerous."[15] To this he adds,[16] concerning some the hunter went after, "We could perceive all three, still standing abreast upon the edge of the precipice, looking down upon us; but they were at a great height. . . . The White Goat is larger than the Gray Sheep, thickly covered with long, pure white wool, and has short, black, nearly erect horns. These animals seldom leave the mountain-tops. Winter and summer, they prefer the highest regions."

On the basis of the information supplied by Lewis and Clark, M. H. D. de Blainville, in 1816, described the creature, naming it *R[upicapra] americana;* but added nothing to its life history.

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[13]Lewis & Clark, Hosmer ed., 1917, II, p. 52.
[14]As above, II, p. 247.
[15]Journal, p. 691. See Buffalo References.
[16]As above, p. 695.

In 1822, C. Hamilton Smith described it as *Antilope lanigera*,[17] and gave an unmistakable portrait.

In 1825, Richard Harlan[18] published a letter from Major Stephen H. Long, who had recently returned from the Far West. In this, he gives the earliest known attempt at a history of the creature which Harlan first and definitely calls the "Rocky Mountain Goat." This seems strange, since Long himself had led the 1823 expedition into the Rockies; and in his report of the same, makes no mention of the White Goat.

The explanation doubtless is that his own expedition did not reach Goat country, and the account he gave to Harlan was hearsay from the Hudson's Bay Co. people at Fort Garry (now Winnipeg). Major Long's account is as follows:

"The Rocky Mountain Sheep inhabit the elevated region comprised in that portion of the mountain range from which its name is derived, situate between the 48th and 60th parallels of north latitude. They are found in great numbers near the head waters of the north fork of Columbia River, where their flesh constitutes the principal food of the natives. The country at the sources of Muddy River, (Marais river of Lewis and Clark,) Saskatchawin and Athabaska rivers are also inhabited by them; but they are said to be less numerous on the eastern slope of the Rocky Mountains than upon the western; they are seldom or never seen at a distance from the mountains, the climate and productions of which appear best adapted to their nature and mode of life. In summer, they resort to the peaks and ridges in quest of pasture, but retire to the valleys in winter. The size of the animal is nearly the same [as that] of the common Sheep; their fleece is white, interspersed with long hair, protruding beyond the wool, and standing erect on the surface of the body, which gives them a shaggy appearance; their horns are short, merely projecting beyond the wool of the head, and slightly arcuated backwards; these, together with their hoofs, are black, while the other parts of their bodies are uniformly white; their flesh has a musky flavour, and is, at best, unsavoury.

"They are of easy access to the hunter, who seldom pursues them unless compelled by hunger. Their fleece is esteemed of little value by the traders, and is used only as a covering to the feet during winter; their skin is of a remarkably thick and spongy texture. It has been asserted by good judges, that the silky fineness of the wool is not surpassed by that of the Cashmere Goat."

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[17]Trans. Linn. Soc., XIII, p. 38.

[18]Fauna Americana, pp. 257–8.

In 1829, Dr. John Richardson[19] gives a technical description of the Rocky Mountain Goat, and an account of it, dealing chiefly with its range and its wool. Added to this, is an etched figure by Thomas Landseer—quite good, except that it shows the creature with its head raised above its back, as in the Common Goat. This is an unusual, or even impossible, attitude for the present species.

Thus the facts trickled in, instead of coming with one sudden, complete picture, as in the case of the White Sheep, or the Antelope. But from this time on, there was a singular dearth of information about the White Goat; in fact, it became considered a great rarity, and even a myth. But in 1879, Dr. J. C. Merrill, an Army surgeon at Missoula, Mont., sent to Prof. S. F. Baird a brief but accurate article on the habits of the animal. This was published by the National Museum.[20]

In 1881, John Fannin, the British Columbia naturalist, published his valuable notes on the Habits of the White Goat. (See References.)

Even as late as 1884, Baillie-Grohman wrote:[21]

"For three consecutive years, I hunted on the breezy mountain ranges of Wyoming, Colorado, Idaho, and eastern Montana, living for months at altitudes over 10,000 feet; but I failed utterly to find this mysterious game elsewhere than in the conversation of romancing trappers and guides; a circumstance that created in my mind a decided tendency to look upon all "Goat" stories with a good deal of suspicious reserve. I heard a great number of such tales. Men told me that they had shot, knifed, lassoed, stalked, staked in pitfall, and otherwise 'gone for' the prized game; and that in their turn they had been gored, spitted, 'treed,' butted, trampled on, and generally roughly handled by redoubtable old rams; and though the Britisher in this instance declined to be 'filled up boots and all' with these hoary old myths of the ultra Western type, they yet generated in me an irrepressible desire to get at the bottom of these wonderful natural-history revelations. I determined that my next annual visit to the Far West was to be exclusively devoted to goat-hunting; and a letter I received in May, 1882, from a reliable friend and countryman residing in Western Montana, declaring that he had actually seen, not a live, but, what was next best, a dead Mountain Goat, made me pack my trunks and engage passage in hot haste."

Thus, in 1882, Baillie-Grohman satisfied himself that the White Goat of the Mountains was no myth. From that time on, goat-hunters greatly increased.

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[19]F. B. A., I. pp. 268–70.

[20]On the Habits of the Rocky Mt. Goat. Proc. U. S. Nat. Mus., 1879 (pub. 1880), pp. 283–84.

[21]Hunting, p. 194.

In 1890, John Fannin and Dr. George Bird Grinnell, both experienced mountaineers, published in *Forest & Stream*, a series of articles (see References) that made a very real creature of the White Goat. The further exploration of British Columbia, its homeland, has resulted in abundance of specimens and material. So that we are now in a position to map its range, and outline its way of life.

Range and Haunts

The map shows clearly that British Columbia is the proper home of the Mountain Goat; 95 per cent. of its race are British-born. Its long, slim and waning colonies in Alaska and Montana comprise the principal Goat population, outside of the "red map" region. Perhaps one quarter of its range is on the Rocky Mountains; the rest on the Cascades, Selkirks, Coast Range, and Bitterroots.

"All goat-hunters," says Hollister, "have noted the fact that Sheep and Goats are rarely found occupying the same range. Hunters commonly speak of a certain ridge or peak as a 'Goat mountain,' or as a 'Sheep mountain.'"[22] The Goat is happier up higher than the Sheep, and has different choice of food and weather. The details of their differences are not worked out. The absence of Goats from such mountains as Electric Peak in the Yellowstone Park is explained by the total lack of drinking places in summer.

An attempt is being made to introduce the White Goat on Vancouver Island, with what success does not yet appear.[23]

How big is the home range of a single individual? If we reckon up the actual acreage of the unbelieveably narrow ledges of its daily beat, we might put their total at less than 10 acres. But if we reckon the tall surfaces set on edge, and take the whole impossible bleak inferno over which its terrifying trails are coiled and flung, we may set the home range at half a township.

Or differently expressed, an up-ended pile of geological strata four or five miles across, affords ample changes of climate, food and scenery, to satisfy the wanderlust of the most restless of these bearded mountaineers.

Numbers, Yesterday and Now

The Goat is an exception to nearly every known rule; and he is an amazing and gratifying exception to the rule that man has wiped out nearly all the big game of America. For the land that the Goat inhabited 400

[22]Mamm. Mt. Robson, p. 43.

[23]Can. Field. Naturalist, Sept., 1925, p. 151.

years ago, it still inhabits; and, so far as we can learn, its numbers are the same.

If, then, we make a careful estimate of the present number of Goats, we shall probably know the ancient population.

When I was in the Glacier National Park in 1916, I used every means to get an estimate of the Goats that frequent the higher half of its 2,500 square miles. Most of the guides agreed that there were about 3,000. But Tom Dawson, with longer experience than the others, was sure that that estimate was too low; 4,000 he thought was nearer the truth. Let us call it 3,500; which gives a rate of 3 to the square mile.

John Muir reckoned that on the icy cone of Mt. Rainier in Washington, there were over 200 Goats in 1894.[24]

There are certainly 300 now; for they have been protected for years, and their enemies have been destroyed. As the Peak is about 20 square miles in area, this gives not less than 15 Goats to the square mile.

The Forestry Bureau census for 1922 gives the Goats in the National Forests of the 3 States concerned as follows:

Washington	1,550
Idaho	4,148
Montana	2,523
To which we add Glacier Park	3,500
Total	11,721

But this does not comprise all of the Goat range. So that, although the Biological Survey gives 6,000 in 1920[25], and the Forestry Bureau in 1922 gives only 8,634 in our National Forests, I feel safe in setting the White Goat population of the United States in 1925, at 15,000.

As the total area inhabited by Goats south of the "Big Medicine Line" is about 50,000 square miles, this would give about 1 Goat to 3 square miles. This, however, is the last fringe, the die-out.

The total area of the Goat range in America is 500,000 square miles. The Glacier Park data, give a rate of about 3 Goats to the square mile. This, as we have seen, is far exceeded on Mt. Rainier, and from the testimony of hunters is far exceeded in British Columbia; no doubt, however, it is offset in other regions by the absence of the sheer mountains that constitute Goat pastures. So that we shall be on the safe side if we assume an average of 2 to the square mile, and set down the total number of the

[24]Mountains of California, 1898, p. 323.

[25]Bull. 1049, 1922, p. 24.

White Goat nation to-day, at 1,000,000. In the light of other direct testimony, as well as the collateral evidence supplied by other species, this seems very near the facts, for the primitive. as well as the present numbers.

Food

We have seen that the Arctic Fox, in a land of dire famine, has expanded his bill of fare to include everything that lives or grows, that can, by any process of mauling, milling, and macerating within the powers of his digestive outfit, be made to contribute one tiny modicum of life-sustaining carbohydrates. Be it ever so small, and the percentage of waste ever so high, he thinks it worth a trial.

Such is the attitude of the White Goat in the Arctic region that is his very own—high in the land where clouds with peaks confuse. Grass, brushwood, moss, and lichens are his fare. In the summer, these are to be had for the easy taking, as he loafs and lazes on some rocky shelf between two bottomless gulfs. But in the winter, when there is deep snow to reckon with, it is not so easy. He can paw like a pony, for an icy meal, but he finds it more profitable to climb up higher to seek some even bleaker spot where the fierce grinding of the blizzard wind, has bared the skimpy grass between the rocks. Here he finds his fill.

The gale may be at 70 miles an hour, and the register of frost at 70 degrees; but these are matters of small concern, so long as he can find the cold-stored hay that keeps his life fires hot.

Two meals a day and many drinks, it seems are his established way. The meals are taken at sunrise and at sunset; but there are numerous exceptions to the rule. His food in captivity is detailed later.

Sanitation and Diseases

Salt-licks. It is commonly said that the Goat, in addition to his vegetable food, eats a great deal of clay. This, of course, refers to the "salt-lick." All ruminants of the high mountains seem under the necessity of repairing periodically to the salt-licks; and, having found a good one, the word is passed about among the Goats, so that their regular pilgrimages make deep-worn trails to the healing, tonic earths. They come for miles to a good "lick" and hang around like human wrecks at a health resort—soaking, rioting, wallowing to the limit, in this strange, cooling something that the fever of the body craves. For a day or two they stay; then retrace their steps to their high home.

Several of these licks I have seen and photographed. It was remarked

by the road-builders in Glacier Park that, after rocks had been dynamited, Goats, as well as Sheep, often came to lick them on account of their salty taste.

It is worthy of note that the species of the alkaline plains have no such need.

Dusting places. Apparently the Goat has need of a dust bath, much as chickens and grouse have. These dry wallows are dusty hollows scraped out by the Goat's fore feet. In these he rolls around, or lies sprawled out by the hour. No doubt, the dusting helps to dress his coat as well as to discourage insects. That is, his purposes are the same as those of a hen when she dusts her feathers. In Washington Zoo, and in New York Zoological Park, the Goats may often be seen indulging in a dry wash.

Grinnell writes me, however: "I don't believe that these so-called dusting places are anything more than the ordinary beds to which the animals resort day after day to lie and rest."[26]

Most creatures that dust themselves in summer, take also a snow bath in snow-times. The following shows that the Goat conforms to the rule.

Charles Greenwood writes:

"J. H. Holden . . . was prospecting, far up a tributary of Railroad Creek; and one day stopped to eat his lunch near some snow banks. His climb had been a long, hard one, and fatigue caused him to fall asleep. On awakening, there were Goats all around him. He counted 34. He lay there, quietly, and watched them. One would make a bed in the snow and lie there, rubbing itself a little while. Then it would get up, go a short distance, make another bed, and repeat the process, continually. The prospector thinks the reason for these antics was that wood-ticks were troubling the Goats, and the rubbing in the snow was to cool the irritation thus produced. It was in June too, and their winter coats were shedding."[27]

The Dung. The dung, as in all Deer, Sheep, Goats, and Antelopes, is in pellets; but differs from those of their near kin in being nearly triangular. From 50 to 150 are dropped at one time; and a dozen evacuations take place each day.

In the Zoo, at least, the Goat makes no pretence of setting aside a place for the dung-dump.

Diseases. The Goats have no diseases so far as known. They are never winter-killed, even in the hardest of weather. They seem, too, to have found an answer to each of the problems offered by the beasts of prey.

There are, however, two other enemies to be reckoned with. The first

[26]Personal letter, May 6, 1926.

[27]Recreation, Sept., 1897, p. 237.

is indicated in the Fannin-Grinnell article. Commenting on the Goat's indifference to strange noises, they add:

"While its failure to hear sounds, or at least to pay attention to them, may in part be due to the fact that, in the situations which it frequents, rocks are continually rolling down the mountain sides, and land-slides and avalanches occur so often that they are common noises of the mountains; yet we are inclined to believe that the White Goat is often partially deaf. On several occasions, we have noticed in skinning these animals, that their ears were full of wood-ticks. In a single specimen we have counted more than 20 of these insects, of all sizes, deep down in the cavity of the ear, many of them so gorged with blood as actually to stop up the auditory canal. Indians have informed us that sometimes persons so afflicted become deaf until the parasite is removed. Whatever the reason, it is certain that the White Goat displays little of the alertness and watchfulness that characterize most of our game animals, and that it may be approached by the hunter with less caution than any other of them."[28]

It was noted in blasting rock during the road-building in Glacier Park that the Goats paid little heed to the report that sent the Sheep off a-bounding.

Sociability and Voice

Some animals are sociable, some are gregarious. The White Goat is both, for it lives in small groups that help each other in present problems; and sometimes it gathers in large bands whose only bond of union seems to be their common interest in the food or shelter of the locality in which they are gathered.

Walter Gibb, of Glacier Park, with whom I followed the White Goat's trail in 1916, tells me that, in early summer, the usual group is 5 or 6; that is, one or two mothers with their kids. More than this are rarely seen together at that season. Later in the summer, however, they assemble in flocks of a dozen or more. In the fall and winter, it is common to see from 50 to 100, of both sexes. In Aug., 1916, at Ahern Pass, Gibb saw 32 together, but this was unusually early. One day, late the previous March, he counted 60-odd on Grinnell. Probably there are 50 or 60 there all the time. It is a favourite Goat range, having salt-licks as well as safe pinnacles and food.

This general rule seems to hold: When your glasses, ranging the far crag, pick up the white blot of a Goat that is surely alone, you may rest assured that you have found an old billy.

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[28]Habits, pp. 46–47.

PLATE LXXII.—MOUNTAIN GOATS IN PHILADELPHIA ZOO

Photographs by E. T. Seton

Being gregarious, and also somewhat sociable, the Goat has many signal sounds. The common call is a deep, coarse grunt uttered by both sexes; and varied with age and the stress of the time. The kids have a little high-pitched bleat that seems used chiefly to call their mother's attention to some opportunity for service—just as our own little ones use their earliest squeak.

Vital Statistics

Gestation, Etc. The period of gestation is about 6 months. At Bronx Zoo, after a gestation of 178 days, on May 20, 1908, one of the Fort Steele nannies, then 3 years old, produced a vigorous kid. This was the cause of great rejoicing among naturalists; so far as known, it was the first ever born in captivity. Its size and history are given later.

Age. To what age does the White Goat live if successful in baulking all the foes that are native to his upland, or liable to confront him when he goes a-roaming on the Plains? The only direct evidence I have is as follows: In Banff (Alta.) Zoo, they have had a White Goat in captivity for 8 years. In the London Zoo, there was a fine male; he was captured June 12, 1899, when about 2 weeks old. He came to the Zoo June 6, 1900. When I saw him there on Oct. 29, 1906, he was in perfect health and vigour. He died, Jan. 9, 1909, when nearly 10 years old. Probably 10 or 12 years, then, is the usual lifetime of his kind.

Mating and Battling

The rut, whether in Idaho or Alaska, takes place in November, usually lasting the whole month. So far as is known, the Goats have no love-song corresponding to the bugling of the Elk.

What are the marriage laws of the White Goat? No one seems sure of them. This, however, I think, is a rule: In all highly polygamous animals, there is a marked difference in the sexes; the male being much bigger, more highly developed and with special ornaments or weapons, as in the Fur Seal, the Wapiti, the Caribou, the Bighorn, the pheasants, etc. In the monogamous kinds, the sexes are much alike, as in Fox, Cougar, Wolf, Raccoon, eagle, dove, swan, etc. Since the nanny and billy are practically alike, the inference is that the species is monogamous, although the tradition of their family is large and emphatic polygamy.

Furthermore, in support of the monogamous theory, we find frequent mention of one billy and one nanny on their honeymoon together.

Roosevelt tells of killing an old billy, that was with a nanny and a kid late in August, in the Big-Hole country of Montana.[29]

Fannin and Grinnell make a point of this: "Only on one occasion, however, have we seen an old male in company with several females. This was late in November."[30]

The guides in Glacier Park were not sure whether the Goats mate in pairs, or are polygamous. They inclined to believe the latter; and yet agreed that one never sees a billy with many nannies during the rut.

In the incident given later of the two billies and two nannies defending the kids from the eagles, we have evidence that points strongly toward monogamy. Under no other matrimonial arrangement could the males be with their families at the season indicated by the size of the kids. Similar testimony is offered by Dr. J. C. Merrill and B. Berendt on a later page.

It is clear, however, that the billies do fight for their mates in the fashion of their polygamous kin. The authorities above quoted say:

"Among themselves, the males have pitched battles which are often severe. We have never seen one of these, but instances are recorded where horns broken off in battle have been found encysted in the flesh of males that have been killed. The long, shaggy coat and the very thick hide of these animals protect the combatants to a great extent from severe injuries."[31]

The following incident, related by B. T. van Nostrand, of Brooklyn, N. Y., is much in point:

In 1901, he was shooting in the Goat country back of Fort Steele, B. C., when he had the luck to witness a finish fight between two large billies. He was on a lookout, watching for a Bighorn, and says:

"As I sat there motionless, two Goats came around a corner of rock only about 50 yards away from me. They were walking rather fast, and whenever the Goat in the rear caught up with the one before him, he gave it a blow with his head. It did not seem to be a vigorous butt, and at first I thought it was play; they were making a low, peculiar sound, such as I cannot describe in words.

"In a very short time, one of the Goats lay down behind a large rock, so that I could see only its head. The other Goat stood, and looked at the one lying down. Just then they saw me, and this seemed to stop the fight, for the standing Goat began to move away. I fired and killed him; but to my surprise the other Goat lay still. I could not hit him from where I was without spoiling his head, so I climbed around to get a better shot. Finally

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[29]Wild. Hunt., p. 124

[30]Habits, p. 47.

[31]As above, p. 47.

I got up quite close, and had a good general view of him. Then he stood up, took one or two steps, and stood still. I then saw that he was bleeding around his neck, that one flank was badly torn, and that some of his intestines were hanging out until they almost touched the ground! He was so far gone he could scarcely stand, and to end his troubles quickly, I shot him.

"This was the only fight to the death that I ever saw among wild animals, and it was done quite differently from what I expected. There was no pawing of the ground, and no frenzied charging. One Goat quietly walked up to the other, and gave him a fierce thrust. The victorious Goat was not even scratched. I presume his first thrust was fatal to the victim."[32]

The Kid Mountaineer

In late April, or early May, the mother Goat, now less then 2 years old, after a gestation of 6 months, goes apart into some secluded corner of her rockland home, and produces her kid. Sometimes she has two, but three are unknown. On Sept. 24, 1916, at Grinnell, Glacier Park, I saw a nanny with two kids.

Fecundity is usually reckoned a racial advantage; that, therefore, two kids at a birth would be better than one. But other considerations come in. One that may be absolutely dominant is shown in this incident supplied me by N. Hollister. The Rocky Mountain Goat in the Washington Zoo, gave birth to two kids (♂'s) on May 20, 1921. The important ceremony of owning the kid is fully set forth in the Bighorn Life; it is just as essential among Goats. During the hour that the mother Goat was busied with the first kid, the blowflies attacked the second; and before she could attend to it, the maggots had entered both anus and umbilicus, so that it speedily died.

The kid born in New York Zoological Park on May 20, 1908, after a gestation of 6 months less 4 days, arrived at 3 A.M. At 3:10, it arose to its feet; by 3:30 it was *jumping* about the stall, and climbing on its mother's back, as she lay upon the straw. It nursed for the first time at 3:20. While nursing, it stood directly under its mother's body, and made a continuous whining noise, like a young puppy. Frequently it butted the udder as do young lambs; and then the mother patiently raised the hind leg to give her offspring a better opportunity.[33]

Amazingly strong and active are these young mountaineers from their very first days on the rocks; and yet it is not customary for them to follow

[32]Campfires, pp. 123–24.

[33]N. Y. Zool. Soc. Bull., July, 1908, p. 429.

the mother at once. A week or ten days they lie hidden, according to their strength and energy. They are visited by the mother several times a day to be nursed. In the second week, they are big enough and strong enough to follow where she leads.

At no time a coward, the Goat mother is capable of almost any heroism on behalf of her little one. A good illustration of her devotion is seen in observations that Prof. H. F. Osborn made in the Goat country of the East Kootenay River, British Columbia (Aug., 1905). His Dog had pursued a mother Goat with its kid. They made for their usual shelter, a rugged cliff; but the Dog was closing on the young one, when the mother turned and charged from 20 to 40 feet at the Dog. Both mother and kid would stamp their feet, and give a slight toss of the head and horns as they defied the Dog. After thus holding off the pursuer three or four times, the Goat escaped with her offspring over the brink of the precipice, where she was safe, and the Dog would have been killed, had he tried to follow.[34]

The Kid and His Bogies

The first fortnight is undoubtedly the most perilous part of their lives. Infant mortality runs high in Goatland; for the powers that make their success in life are now at their minimum. Many beasts of prey—Coyotes, Wildcats, Lynxes, Wolves, Wolverines, Cougars, Blackbears, and Grizzlies, as well as men and eagles—are all of them ready to feast on a young kid, if they can find him within reach. Yet, from nearly all of these, his own agility can save him, after the period of helpless hiding.

"Joseph Kipp has informed us that in the 'Colonel's Basin' in the St. Mary's Lake Region, Montana, he has seen tracks in the snow where young and old Goats have been chased by Coyotes. It would seem, however, that an old female Goat would have no difficulty in beating off a single Coyote which might attempt to seize her young. . . .

"It is possible that Lynxes and Wildcats occasionally kill young Goats, though probably this does not happen often."[35]

In the fall of 1905, Tom Dawson of Glacier Park, was with John Clarke on the back of Mt. Rockwell, when, across the valley, they saw a Grizzly-bear trying to catch a kid Goat; while the mother, from a safe place higher up, looked on with apparent unconcern, for she must have guessed that her young one was well able to take care of himself. The kid kept along the top of a slide, while the Bear scrambled along lower down, parallel, but

[34]N. Y. Zool. Soc. 10th Ann. Rep. for 1905, pub. 1906, pp. 228–31.

[35]Habits, p. 67.

climbing all the time. At last the kid reached the end of the slide. There it stopped and faced the Bear. The latter came on, and when within 10 or 15 feet, made a rush at the kid, which turned like a flash, and bounded up the nearly straight cliff toward its mother; whereupon the Bear gave up the attempt.

From a single Coyote or Wolf the mother could effectively defend the kid, as we may guess from her baffling of the Dog, as related, But there is another and more dreadful enemy.

Next after man, the eagle is the most dangerous foe of the White Goat. In spring and early summer, before the kids have acquired much strength or experience, these birds are persistent in their attacks. They kill numbers, seizing the young Goats on the cliffs which they frequent with their dams, and carry them off to convenient perches, where they devour them at their leisure. The Indians report that the destruction from this cause is considerable; and would be greater but for the wisdom and courage of the old ones. Two or three families will unite their forces and successfully defend their young.

More than one eyewitness has given us a thrilling account of these eagle attacks and their bafflement by the brave old Goats.

Thus L. L. Bales writes: "I once witnessed an attempt made by two large eagles to capture two kids from a group of two ewes and two billies. I was watching the group which was feeding on the moss that grew on a high slope of a rock thrown up by the movement of a glacier, when suddenly they bunched in a hurry with the kids under them. They sat on their haunches and kept their heads and horns up and out, and four larger ones forming a circle. They were a good half mile away, yet I shall always believe I heard the rush of those two eagles through the air in their attempt to capture a kid. I saw them make four unsuccessful assaults that day; but that they are successful at times I do not doubt. If they were not, they would not make so many attempts."[36]

In the spring of 1905, Charles L. Smith, the British Columbia guide, saw a female Goat successfully defend her kid from a golden eagle. The Goat stood close beside her young, and whenever the eagle swooped and sought to seize the kid, the mother would rear on her hind legs and make such vigorous horn-thrusts at the enemy that in a short time the eagle abandoned its attempt.[37]

But she cannot always save her little one, as is evidenced by an account published in *Forest & Stream*, Feb. 24, 1881: John Fannin, with a couple of

[36]Habits, p. 67.

[37]Campfires, p. 120.

Indian guides, was in British Columbia with the purpose of bringing back alive a young Mountain Goat. The older Indian was climbing after a very young one whose mother was leading it away. As the Indian came near, the mother reached a shelf to which the young one could not follow. Then in his own words:[38]

"All this time a large, white-headed eagle soared in majestic circles directly over the scene. After several unsuccessful attempts to reach its dam, the kid started back toward the point from which the Indian was advancing, but before proceeding very far, sprang down a narrow shelf and stood concealed beneath an overhanging bush.

"The Indian in the meantime working his way upward, stopped within a few feet of the place; but from his actions, I was satisfied he was ignorant of the kid's position. . . . He commanded, so far as I could see, the only way by which the kid could escape; for below was a perpendicular cliff of a thousand feet against the side of which no possible foothold for anything without wings could be seen. But in this I was mistaken, for a rock, loosened by the Indian's foot, rolling over the cliff started the little animal from its hiding place, and with a bound it sprang outward and down. The thought of its fate sent a shudder through me. A thousand feet, sheer down, to be ground to atoms on the rocks below. But no—down it went fifteen or twenty feet, alighting on a rocky cone which stood at a slight angle from the main cliff, on the top of which there was scarcely room for its feet huddled together. Had it started from that point and soared away over the tops of the trees which studded the valley, it would not have surprised me in the least, and I waited breathlessly for its next move.

"For a moment it rested like a speck of snow upon the dark gray granite cone; then with a downward spring of perhaps ten feet, it reached a narrow shelf which had before escaped my notice, and which ran along the face of the cliff to the wooded mountains on the right. But a sadder fate awaited the unfortunate animal than if it had fallen into the hands of the Indian. The terrible bird which in narrowing circles had kept about the scene, and whose piercing eye had taken in the vantage of the position—the kid separated from the protection of its dam—stopped suddenly in its course, then swooped downward swift as the lightning's flash, its great wings cleaving the air, and seizing the poor kid, just when life and liberty seemed so near, bore it clear of the cliff, fluttered a moment in mid air, then drifted downward along the mountain side, disappearing below the tops of the swaying firs."[39]

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[38] As given, pp. 64–65.

[39] Habits, p. 67.

The Developing Personality

The energetic personality of the kid is early developed. It may be illustrated by this incident given me by Abe Leeds, who was my Goat guide in the Bitterroot Mountains in 1902: In the spring of 1899, he was with his partner crossing a snow-slide on the Bear Creek, just below a great boulder that had partly split the slide, leaving a crack on the lower side. Goat tracks were plentiful; and as he passed this open crack, he looked in and saw a young Goat about seven feet down. The crack had apparently been drifted over, so the kid had walked on it and fallen in. He was about a month old, and quite well and lively. Leeds jumped down, but the kid attacked him vigorously—not with horns, but with fore feet. Leeds hoisted him out, and took him to camp, where they soon turned him loose. But he quickly found that this was the best place to feed; so he voluntarily stayed with his captors and became quite tame. He lost all fear of the men, and would come and stamp at their feet when teased.

The story of Fannin's kid, given at the end, offers a charming and detailed picture of a young Goat's mind. It also gives a delightful account of the game of tumble-down-a-sand-bank, which that kid played, and which undoubtedly is an amusement of all the wild kids at this hilarious stage of life.

In a wild state, their development is, of course, much faster than that of this captive. At a month, they are accomplished mountain-climbers. At 5 or 6 weeks, they eat some solid food. At about 2 months, their weaning begins; and now they are recognized members of the flock—with little influence, perhaps, but with votes already. For when an emergency causes a split in the band, the minority usually rejoin the rest, even though its number is chiefly made up of kids.

An interesting episode of this period, was told me by Louis Overturf, my guide, in the Bitterroots, 1902. He says that in the middle of October, 1898, he was in camp with a survey party on El Capitan. A flock of White Goats came in sight around the mountains. There were four nannies with a kid each, and one billy. Sometimes the old ones leaped to a place where the little ones could not follow, whereupon the kids set up a squealing like that of a Calling-hare. The old ones would wait then, and the kids skirmished around till they found an easier road to follow.

There seems to be a sort of mothers' meeting at this season, for nearly always two or more mothers with their kids are seen at this time; and sometimes the family reunion seems to be complete, for the billy is often seen in

these small bands. Merrill says, "During the summer the male, female, and kids keep together."[40]

B. Berendt, while hunting near Baker's Inlet, B. C., Sept. 24, says that he came on three Goats—"a family group consisting of a buck, a female and her kid."[41] Many other similar observations are at hand.

The History of the Bronx Kids

The life of the wild ones is admirably pictured for us by Charles A. Chapman, who set out with Jimmy Smith, to capture kids for the Bronx Zoo, in the spring of 1905.

On a mountain near Fort Steele, B. C., they found a number of kids, and chased them in vain all day. The tiny mountaineers, led by wise mothers, were too fleet for the men.

Next day, the hunters devised a new plan, and, quite unexpectedly, got some light on the powers and courage of the mother.

"By daylight," Chapman says, "we were breasting the heights once more, this time with Jimmy partly dressed in Goat skin. It was an idea of mine—that Goat skin disguise. By and by we marked an old nanny and a kid feeding out on a snow slide, whereupon we started to stalk as close to them as we dared. Tying a white handkerchief over Jimmy's head, to still further make him resemble a Goat, I started him on his hands and knees towards the mother and kid, hoping that the mater would mistake him for an overgrown billy of her acquaintance. I cannot say what she thought of the arrangement, but when he got within about twenty yards of the pair, the old lady put down her head and came for Jimmy with vengeance in her motherly eye.

"Goat's horns are sharp, and Jimmy knew it. It was no fault of his that he didn't strike Sweden in three jumps. . . . But the old Goat, when she found what it really was, quit that region at a pace that words won't describe very easily. The kid went with her, but not all our hopes. We followed after them, and about dark, we caught the kid at a place where there was an overhanging cornice of rock which the old one managed to negotiate, but which was too much for the little one."

Four others were quickly secured—in all, 3 billies and 2 nannies. Guided by experience, their captor fed them on St. Charles cream, thinned with warm water, and given in a feeding bottle.

"Truth to tell, I had not much trouble with the little fellows, and used

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[40]Habits of Rocky Mt. Goat, Proc. U. S. Nat. Mus., 1880, p. 283.

[41]Field & Stream, Nov., 1920, p. 662.

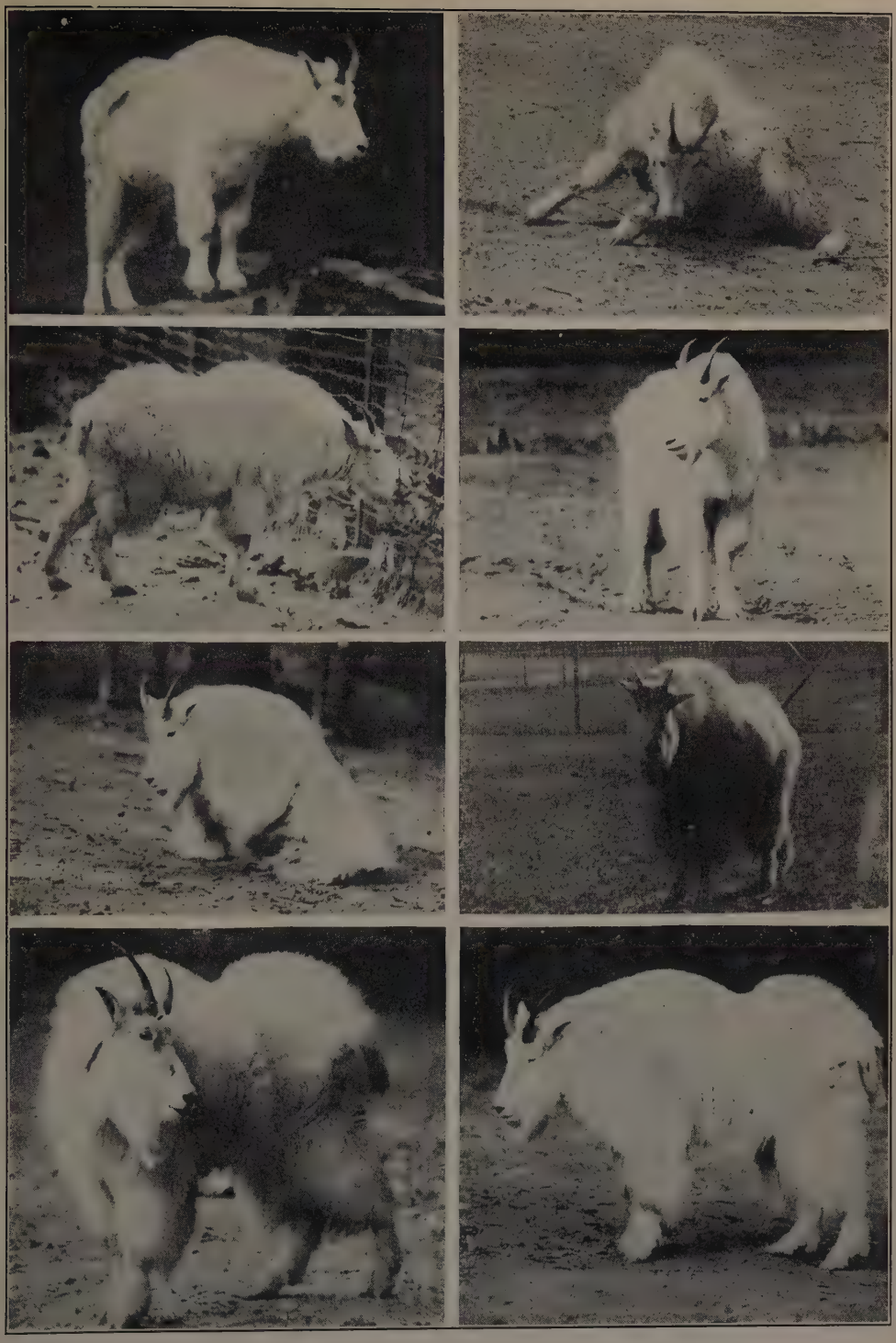

PLATE LXXIII.—MOUNTAIN GOATS IN WASHINGTON ZOO, NOV. 4, 1925

Photographs by E. T. Seton

to feed them about every three hours, day and night. If they got hungry, they would either jump on me or climb all over my body—for I slept in the little corral with them. I found if I left them, they got uneasy and tried all manner of ways to escape. . . . Poor little orphans, when I had them fed, they would all lie down close beside me and go to sleep, I suppose, or, at any rate let me get forty winks, till hungry again, when they would beat me with their fore feet. Their mothers must have a hard time with them, but not many others had as many as I was blessed with."

At first they were fed wholly on the cream and water, but soon it was found that they did better with an added ration of birch leaves and twigs. In the fall, he began to feed them a mixture of bran and oats, on which they throve. Also they greedily ate good clover hay, and were given all they cared to eat of it. They were in fine shape when sent to the Bronx in the late autumn.[42]

There, they were kept in excellent health on a diet of clean crushed oats (in the hull), sliced carrots and potatoes, an occasional apple, and all the clover hay they could eat.

Strange to say, their soft, woolly coats were found but a poor protection against soaking rain; so that the keeper had to shut them in shelter when a storm began.

Though not quarrelsome among themselves, they were so ready to prod each other with their dagger-like horns that it was found wise to saw off the sharp tips.

On May 20, 1908, one of these nannies, then 3 years old, produced a vigorous kid. Its size and history have already been given.

The Peace of the Crags

"It may be said," observe Fannin and Grinnell, "that, as a rule, these animals are quiet during the middle of the day. We believe that they feed and move about a good deal during the night, and they are usually to be seen feeding in the early morning for a couple of hours, and again just before night."[43]

It is his habit to lie on the southern slopes during the hours of sunshine, dozing, lazing, chewing the cud, or casting his golden-brown eyes in the far reaches of the land below; with mild curiosity noting the passing of other game.

Sometimes one old billy affects a particular perch and haunts it for

[42]Catching Kids, pp. 680–82.
[43]Habits, p. 28.

weeks. Short trips he makes at sun-up and at night, to feed or drink near the foot of his cliff. But his early impulse is to seek again his rocky lookout on which he is safe, or at least be near a stairway that leads to perfect protection from everything on four legs.

His occasional stolidity is shown in this remark by Fannin and Grinnell: "Often, indeed, a little group may be seen for 24 hours in nearly the same spot, scarcely changing their position a hundred yards."[44]

"They loved to lie on southern slopes, bathing themselves in the glorious sunshine, and blinking away the hours. Whenever a herd was sighted at rest, it was safe to count upon its remaining there for an hour or two, unless disturbed by a hunter."[45]

"But there was one old billy who fascinated us all," say Hornaday and Phillips. "When we looked out of our tents on our first morning in that camp, he was calmly lying upon a ledge at the foot of the cliff, immediately above us, near a bank of perpetual snow. For *two days* he remained there, at the same elevation, moving neither north nor south more than three hundred yards. When hungry, he came down to the foot of the cliff and fed on the tender plants that grew at timber-line, then climbed back to his favourite contour line, to lie and doze away the hours."[46]

"If any one," say Fannin and Grinnell, "will take the trouble to watch these animals day after day, he will observe among them a tendency to descend the slopes in the afternoon, and to reascend them in the morning. We say a tendency, for we do not intend to imply that the habit is universal. We are inclined to believe that this results from their seeking the highest, coldest peaks of the mountains during the hottest portion of the day. It is certain that heat causes them great suffering."[47]

Peculiar Habits

His choice of the frozen peaks does not imply that the Goat is wholly indifferent to gale and zero weather. Wind especially is obnoxious to most animals—not excluding man. And as we have already seen, the Goat is peculiarly sensitive to rain, wholly unequipped indeed to meet it.

It is not surprising therefore, that this creature of cathedral towers should often be seen in the niches thereof—that the climber of the peaks should seek for cozy, sheltering caves; should have, indeed, like the Hare, a dozen well-known forms that are adapted to a dozen different slants of

[44]Habits, p. 28.
[45]Campfires, p. 109.
[46]Scribner's, Aug., 1906, p. 143.
[47]Habits, p. 28.

wind and weather. Some of them are shelters from the fury of the storm; some give protection behind which he takes a sunbath. But all are well known to him, are frequented regularly, and are connected with his scheme and place of life, by perfectly known trails—trails that nothing but a Goat can follow.

The Poodle Trick.—One of the strangest and most unbovine habits of the Goat is his trick of sitting up on his hind legs with front paws dangling, like a Squirrel or a Bear. This is usually done when his curiosity is aroused.

Thus Roosevelt, telling of his Goat hunt, says, "The old billy saw me at once, but evidently could not quite make me out. Thereupon, gazing intently at me, he rose gravely on his haunches, sitting up almost in the attitude of a Dog when begging. I know of no other horned animal that ever takes this position."[48]

Baillie-Grohman adds that in consequence of this habit, "the hide and hair on the rump of old animals are quite worn and much thicker than elsewhere. On one occasion I approached such squatting Goats to within sixty yards."[49]

If one could see the white-bearded patriarch sitting up in the door of his cave, it would furnish some fine material for an Old-Man-of-the-Mountains story.

Swimming. Those of us who know the Bearded Sage of the Peaks, peacefully browsing along the cornices of his death-environed, cloud-capped steeples, hardly think of him as a creature that ever has a chance to swim. Yet, on the West Coast, where he ranges down to tidewater, he is known to swim rivers and arms of the sea, quite fearlessly, if it seem to him desirable to reach the other side without going around.

His Way of Life

Never shall I forget my first glimpse of the White Goat. It was at Iceberg Lake in Glacier Park, where we had camped overnight. When the sun arose, the sheer mountain wall across the water, was capped and girdled with clouds; its head was hidden and its feet were hidden. On the broad, straight breast between, like white sea-birds on their nests, were three or four Mountain Goats perched, or calmly moving about, disappearing or shaking their white beards as they lay at rest and chewed their placid cud.

How they got up there, I could not see. How they could get down, was past me. And the feeling which came over me, strong and insistent, was

[48]Wild. Hunt., p. 124.

[49]Hunting, pp. 198–99.

a throat-clutching of horror: Oh, mad things, you never can get down alive!

Yet they did—and do it every day. This is their way of life. No other creature on legs could do it, no Bear or Cougar. I doubt if a Monkey could, or even has the nerve to try. It seemed that nothing but a bird could frequent the appalling six-inch ledges strung brokenly on overhanging walls twixt dizzy death and blue eternity—and still live on, in the sweet complacency that is born of gratified instincts and unbroken success.

An old mountaineer it was that wrote of this white-bearded steeplejack: "He whiles away his leisure hours on the mansard roof of North America; and for recreation, he 'four-steps' along the edge of an abyss of the kind Doré has portrayed in illustrating Dante. After he has scaled the side of an almost sheer precipice, he peeps around the corner of the top of the world, and positively grins. . . .

"If there is a precipice bordered by a sound, flat top, the Goat invariably takes the edge and gaily trots along on juts of rock scarcely big enough for a hat rack. After you have climbed for hours, and are winded, shaken and exhausted, you will frequently locate him about a mile away on the other side of a ravine that you swear can't be crossed with anything short of wings. Then he stands there and *looks at you*, and if your glasses are strong you can positively see his whiskers wag."[50]

If, on some lowering morning when clouds and flying scud are drifting low over Manhattan, one could look from the Times Building, out and up to those higher peaks, the Equitable, the Metropolitan, and the Woolworth, and see white creatures—Goats, incredible Goats—crawling along the cornices, pulling themselves up on the turrets, or calmly chewing their cud as they lay looking down from the weather vanes, we should have much the same sensation as in watching the bearded mountaineer in his cloud-hung, perpendicular home.

What a perfect model he is for all mountaineers! He never lopes, and rarely trots; he is never in a hurry; and never moves till he is sure. No matter how great his danger, he plays the safe game, and makes slow haste to get out of sight. Not even when a month-old kid, can he be rattled by peril. Never once has hunter made him hurry his calm march, never in history has he been stampeded. In thunder, earthquake, or landslide, it is the same. You cannot shake his nerve by shooting. The shots may be falling all around him, but he never turns his bearded head or jumps; he seems neither to see nor hear you; but fixes all his attention on the trail he is picking out, and climbs fearlessly where no other four-foot on earth could follow.

[50]Russell Mott, Field & Stream, Aug., 1919, p. 392.

He does not hesitate to jump down 20 or 25 feet to a lower ledge; and no matter how icy it be, his hoofs are sure to grip. No one ever saw him miss his footing; with him there is no such thing as slipping or falling. He cannot leap upward very far, seldom attempting more than 3 or 4 feet. But I have heard the hunters describe his way of rearing on his hinder legs to reach up 5 or 6 feet, and hook his front hoofs over a higher narrow ridge; then, like a trapeze performer, haul himself up to some other impossible-looking shelf overhanging the abyss. Similarly, if there be head room, he can turn on a 6-inch ledge by rearing upright on his hinder legs; then facing about to drop on to all four feet, headed the other way.

Wm. W. Seymour, Mayor of Seattle, has sent me the following amazing observation on the White Goat's mountaineering. The exploit was witnessed and vouched for by four of his friends. They sign the following statement:

"Last August, we saw a Mountain Goat working his way up the almost sheer rock ledges of Little Big Chief. At a seemingly impossible place of the climb, I yelled involuntarily: 'Don't go there, you idiot—you can't climb that!'

"But he did just the same. In several places the Goat leaped his whole length (not height) upwards to the next ledge. Finally, he tried one jump he could not make. It was more than a long goat-length above him. His front feet just reached the rim of the ledge, but were not over enough to pull up.

"We expected the Goat to be dashed to pieces in a fall. Instead, he pushed against the side of the ledge with both front and hind feet, turned a complete somersault in the air, and landed securely on all fours on the ledge below, the one from which he had sprung." Signed—Joseph T. Hazard, Harriet M. Taylor, Florence McComb, Glen F. Bremerman.

Calm, self-confident, secure on his castle battlements, unassailable, and fearless is the white-bearded sage of the upper rocks. With nerves of steel, with limbs that fail not, and a heart for ever unafraid, the whole wide world of mountains contains not such another creature. He is, above all things on legs, the matchless climber, the king of the cloudy peaks.

Tree-climbing Goats

Many animals which climb trees readily, cannot follow a White Goat when he takes to his stairway. It is not surprising, therefore, to find that in menageries, the Goat delights in climbing up ladders and sloping trees,

though they must of necessity be either very sloping or much branched from the ground up.

The only case that I find in my notes was given me by my Bitterroot guide, Will Kerlee, as follows: In the February of 1900, he was tracking a Goat through the deep snow along Tincup Creek. The snow was very soft, and the Goat avoided it, as much as possible, by walking all logs. He had come to a lodge-pole pine that was nearly down, and he walked up this for 40 feet; then jumped down at a place where it was 8 or 10 feet from the ground. The pole was about 10 inches thick at the ground, and 6 where he jumped. There can be little doubt that he would have followed the pole even along its 2-inch thickness, had it served his purpose, or led to some ledge.

So far as recorded, the Goat has never walked a tight-rope; and yet the hunters who know him, have no doubt that he could do it with ease and certainty. Yes, even if it spanned a gulf 2,000 feet deep, and stretched between two peaks a mile apart.

His Chosen Homeland

He is not only the one hoofed animal in North America whose chosen haunt is cliffs above the timberline; he is the highest-placed mammal in our world. And nowhere, with possible exceptions in the Andes or Himalayas, is there another animal that, surrounded often by warm and flowery lands, deliberately elects to live in the realm of eternal snow, the upper side of the timberline. Birds may visit such places, in the brief, bright summer, but they lose interest in the peaks when winter comes. The high climbing Calling-hare and Chinchilla, with their parasite, the White Weasel, belong to lower levels. His unchanging coat of white is proof that the Goat is child of the lasting snow; and given only snow for drink and a scattering of the miserable herbage that snatched a hasty spell of life on the glacier's edge in the short bleak summer, the Goat cares not how high he may go, or how cold and blizzard-swept it may be. This is his safe and happy land, his own kingdom, with guardian dragons and angels that can neither be fought nor bought; and these they be,—the appalling crags, the snow-slide, and the blizzard wind.

Wise too is this white-robed steeplejack. He always knows where he is going, and usually has been there before. Every trail in his homeland is clear in his memory; he knows the range so well that mountaineers in a new region commonly get guidance from the Goat trails, for these are the ways dictated by complete knowledge.

"Once while bear-hunting at Lake Josephine with Charlie Smith," says the author of "Canadian Campfires," "we came to a particularly high, long, and smooth precipice. The rock wall was nearly half a mile long, and, I think at least six hundred feet high, with a hundred feet of very steep slide-rock at its foot. It curved around a basin, like the wall of a gigantic colosseum. A big and shaggy billy Goat elected to walk across the face of that appalling wall, about half-way from bottom to top, and as we slowly marched past far below, we watched him.

"He was so high up, that he felt no fear of us, and on the dizzy course that he elected to take, he looked like a mechanical toy pegging along. In that clear air, however, our glasses brought him down to us exceedingly well.

"As is always the case when upon rocks, the firmness with which each hoof was planted—to avoid slips, and to detect loose rocks—gave the animal a very stiff gait. His steps were long, as regular as the tick of a clock, and not for one second did the animal hesitate regarding his course.

His gait was steady as if he were walking along a smooth road, and the directness of his course was remarkable. Occasionally he paused to look down and scrutinize us; but after each inspection, he jogged on as indifferently as before. I am sure no Mountain Sheep, nor any other American animal, ever would attempt to go over that appalling course. It was a sight worth coming far to see.

"How could the Goat have known that a practicable route lay before him? There must have been a stratum of rock, harder than that above it, which had disintegrated more slowly than the rest of the wall, and left a projecting rim; but if so, our glasses failed to show it. The spectacle we saw was of a big Goat briskly promenading on nothing, straight across the face of a bare wall. We watched him with bated breath, as one watches a steeplejack who is repairing a finial; and for my part, I would not have shot him for a hundred dollars. To have killed him as he traced out that dizzy path would have been murder, no less; and think of the unforgetable horror of his fall through space upon that jagged slide-rock."[51]

There is a kind of trail on which the Goat specializes, that is, indeed, one of the dragons that guard the way to his country. This is on a sheer face, a 12-inch ledge that peters out, to resume after a gap of 8 or 10 feet, with dizzy death all about. There are few creatures would dare to make this leap; and yet the Goats take it without hesitation, and have never been known to fail.

When He Journeys

Commonly he sticks contentedly to the little hinterland of horrible crags above timberline that he calls home.

At other times, the self-confident old sage makes long journeys into far countries, over strange scenes, among most ungoatlike surroundings; such as open plains, broad, flat glaciers, mountain meadows, or fallen timber. Thus Grinnell tells me of a Goat that a friend of his killed far out on the prairie of Two-Medicine Lodge River. Very dangerous trips are these, but mostly made with a definite purpose; such as to seek a change of range, a cooler place, a new food, a salt-lick, or perchance a mate. These journeys are not undertaken often; but when they are, they are followed with a quickness and directness of aim that is most puzzling and impressive. His foes may find him as he travels, but there are few indeed that care to attack him at such times. He has two sharp daggers to fight with, he has strength, and he has courage that was never overmatched.

[51] Campfires, pp. 94–95.

Beware

And what manner of temper hath this calm child of the peaks? "Beware the wrath of a patient man," says an old adage. And our steady, sturdy, calm-tempered Goat is an outstanding illustration in point. Suppose that a Dog and a hunter close on him, as may happen at rare times; his lifelong *sang froid* does not desert him. He runs not one step from the Dog. The small White Buffalo halts, looking backward; he stands braced, out on some rock, apparently indifferent to his impending fate. But never rattler was quicker to strike when the right moment comes. The instant that the foolish Dog closes in, there is a vigorous lunge—a flash of that patriarchal head. The black daggers do their work,—a Dog stabbed to his death is sent flying through air into the fearsome gulf.

Just such a scene was witnessed by Enos A. Mills. He writes:

"Hunters and Dogs cornered an old billy near me in the head of a glacial cirque, in what is now the Glacier National Park. The Goat made his stand on slide rock at the bottom of a precipitous wall. He watched for an opportunity to escape, and made one or two himself. The Dogs surged round him. He leaped at one, and with a remarkably quick move of head, struck and impaled him on his sharp horns; with a twisting, upward toss of the head, he ripped and flung him to his death. In rapid succession he killed three Dogs. The fourth Dog was tossed entirely over a precipice. At this the other Dogs drew off.

"Finding himself free, the Goat did a little desperate rock work to gain a ledge, along which he safely climbed. He stepped accurately, and though the ledge was narrow and covered with small stones, there was no slipping and only a few stones fell. The Goat defied and defeated this pack of Dogs so coolly and easily that I could believe, as I had been told, that he is more than a match for a Blackbear."[52]

His Fighting Foes

After the arch-enemy man, who is an unnatural foe—because not natural to the Goat region, and never fighting fair nor with nature's weapons —the chief destroyers of the old Goats are Bears, Wolves, and Mountain Lions. As we have seen, the eagles are a menace to the kids.

"Largest," says John Fannin, "but least dangerous of the enemies of the White Goat, is the Blackbear, which, on the Pacific coast, at least, lies in wait for these animals among the rocks; and, if it fails in its first attempt

[52] Watched by Wild Animals, 1922, pp. 3–4.

at capture, often pursues it for a short distance. We witnessed an occurrence of this kind on one occasion on Mt. Yo, on the North Arm of Burrard Inlet in British Columbia. The Goat was seen trotting down the extremely rough slope, which lay between the summit and a bench where we stood, and not far behind it was a Bear in pursuit. Both animals were going slowly on account of the extreme roughness of the way. They came down to within 50 yards of where we stood, when the Goat turned off to the left. Our companion then shot at the Bear, which thereupon gave up the pursuit, and ran off. The Goat, after proceeding a short distance, stopped and looked back. It is doubtful whether a Bear could overtake a Goat among the rocks, though it could do so on level ground."[53]

"The larger Gray or Timber Wolf is a dangerous enemy to this species, and destroys many of them. We have found the hair and wool in the droppings of the Wolf, as has been done by others. Mr. Anderson speaks of the danger . . . and says: 'Wolves are great enemies to Goats and no doubt make great havoc when the kids are young. . . .'

"Mr. L. L. Bales writes us: 'That the large Gray Wolves catch them I know, as I have seen the wool and hair in the droppings left by the Wolves.'"[54]

John Muir told me that in northern British Columbia, the Goats frequent the grassy slopes above the timberline just below the needle-like pinnacles. Here they are safe from Wolves. But they are great wanderers, and he had seen them far out on the ice of the glaciers. Once, on the Muir Glacier, he saw two or three Goats backed up against a cliff, standing off some Gray-wolves. Night came down, and prevented him seeing the finish.

One can guess that the Goats would be slain, but that they would not die alone. The long black daggers would surely take toll of a considerable number of the assailants. Once, about three miles out on the Glacier, Muir found the remains of a Goat that had been chased out there and killed by Wolves.

In Idaho, my guides assured me that the adult Goats fear neither Dogs nor Wolves. Their chief enemy is the Mountain Lion or Cougar. Our party hunted hard for a month in the Bitterroots during the September of 1902. We saw two Goats and two Cougars, but got nothing. In one case, we found the tracks of a Lion following the track of a Goat and her kid. Lions were common here, to which fact is due the scarcity of Goats.

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[53] Habits, p. 67.

[54] As above.

There can be no doubt that the eagle is the worst foe of the kids, and the Cougar of the grown Goats.

Roosevelt supplies an exceptional light in the following: "One midwinter, my friend Willis found a Wolverine eating a Goat which it had killed in a snowdrift at the foot of a cliff. The savage little beast growled and showed fight when he came near the body."[55]

The Snow-slide

The last of the enemies—maybe the greatest enemy and the greatest friend of the Goat—is one of such character that it needs a chapter to itself. That friendly enemy is the snow-slide or avalanche.

"Avalanche" they used to call it in our books of a hundred years ago, because that was its name in Switzerland where chiefly one heard of it. But when the Rocky Mountains became known to our people and our writers, with a thousand times as many of these snow terrors as in Europe, they became a part of our daily thought, and thus perforce achieved an English name. So "avalanche" is now unknown to the hunters; "snow-slide" it is from end to end of the great snow-ridden chain.

These things we must remember to realize the terrors of the snow-slide: That it occurs in tens of thousands of places every year, chiefly in the spring; that commonly it takes a familiar trail, but often breaks off in a wholly unexpected place; and that it is terrible enough to dictate changes in the plans of railroads that wish to cross its country.

The dizzy peak, the blizzard wind, the muscle-racking climb, the slippery ice-cone, the treacherous rock-slide, are things that the brave and hardy mountain hunters reckon on, and face with resolution. But the snow-slide is a wholly different matter. Swift, sudden, unexpected, world-engulfing, overwhelming, absolutely inescapable as the Day of Judgment—its very name strikes terror; and at the season of the snow-slide, the bravest of the mountain men will tell you that they "hain't lost nothin' in them peaks."

The best description at hand of these overwhelming snow-quakes is by Col. Geo. O. Shields.[56] From his article I condense this account:

Had they been informed, the wise men who named the Seven Wonders of the World, would have made an eighth place to include the snow-slide of Goatland.

In some years the snowfall is light and the snow-slides are small. But

[55]Wild. Hunt., p. 129.

[56]Recreation, Nov., 1902, pp. 337–47.

sometimes there comes a winter when the snow piles up 10 or 20 feet on the hills. Then look out for world-shaking horror in the spring, when the slides break from their beds on the summit, to go roaring and speeding down to the canyon 5,000 feet below.

In the spring of 1902, Col. Shields and William H. Wright were exploring the mighty snow-ridden Selkirks; and pitched their tent in a forest of great cedars, about 100 yards from the north edge of a slide moraine, in order that they might have a good view of the great slide when it should come. They watched for it day and night. Finally, after having been in camp about two weeks, and when seated at supper one night, they heard an ominous rumble from far up in the mountain.

"There she comes!" said one of the boys. In an instant, their food was forgotten; they rushed out of the tent. By that time the roar, the grinding, the crashing were tremendous. The earth trembled under their feet, and the branches of the trees about, vibrated from the air currents set in motion by the great slide. The men could not see from their camp ground the high precipice over which the mass must plunge; and had not time to reach a point whence it could be seen. But, as they stood there, gazing in the direction of the roar, they saw great clouds of mist and snow rising through the tree-tops.

"There she goes over the precipice,' exclaimed Wright, as the whole earth trembled and boomed still more violently with the shock of the falling mass.

It had begun with a mere general heaving of the snowy mountainside, but the speed was ever increasing. Within a quarter of a mile, it was going at the rate of 10 miles an hour. When it leaped the cliff, it trebled its speed, and raced down the 60-degree incline with the rush and power of a hurricane.

A few seconds later, the vast wall of snow and ice swept in sight within 200 yards. It was like a tidal wave on the ocean. It came in an almost perpendicular wall, 20 or 30 feet high and 200 feet wide, with the loose snow curling, seething and foaming over its front. It gained force as it came. It gathered rocks—it gathered trees. The rocks were flung about and ground against the walls of the gulch. Uprooted trees on it were tossed hither and thither by the changing currents of snow, as a man would toss straws with a pitchfork. The winding of the gulch gave strange bearings to the white flood; the side confronted by a turn, would be checked. But quickly the pressure behind would increase until the front of the column of snow would break loose and surge on.

Sometimes one section or one line of the snow, having a greater pressure

behind it than another, would shear a channel straight through the main body that was moving more slowly, and would be forced to the front, leaving a cut with perpendicular walls that were polished smooth and clean, to a height of 10 or 20 feet. The world-roar of it was frightful. It was like the rumbling of an old-fashioned grist-mill, multiplied a thousand-fold; it was like a freight train passing overhead on an iron bridge, but intensified 10,000 times. Yet no simile can make one realize that thundering uproar, and the sense of its overwhelming might.

Forests of timber, thousands of rocks, tens of thousands of snowballs—some of them 20 feet in diameter—roaring, whirling, leaping high in the air, everything dim with spray and movement. Trees and banks, and small cliffs are ground to nothing. Had New York Post Office Building stood on that line, it would have been swished into the valley just as a house of cards would be swept away by a flip of your hand. If Brooklyn Bridge had stretched across its right of way, it would have gone down into the creek as easily as a cobweb before the broom.

This, then, is the irresistible, swift monster of the high peaks—the demon that, once aroused, cannot be dodged. The hunter in the track of a snow-slide is absolutely doomed, however swift or wise he may be. The flying, moving, rushing mountain side is after him, and will grind his bones and bury his every trace.

If there is anything on this earth that will take the conceit out of man in twenty seconds, and show his utter helplessness, it is to stand on the fairway of a snow-slide, and see it coming. It is the most appalling, the most heartrending, the most nerve-destroying sound and sensation that is known on earth.

The Goat and the Snow-slide

This is the remorseless demon of Goatland. Has the wise old Whitebeard of the high places some secret, that on him confers immunity, that turns the destroyer into a saving friend? So it would appear. For he has learned to live up high, beyond the snow-slides, especially in the springtime, when chiefly they are rife; he avoids the ravines and canyons which are their known runways. Finally, the Goat knows what it means, when the roaring begins in the high peaks; and he does not lose his nerve, but climbs some sheer cliff, with quickness and precision that usually spell salvation.

H. E. Jones, the well-known guide of Glacier Park, tells me that in the summer of 1916, he and two other men were high up on the Triple Divide, when they heard a roaring sound, and saw a huge rock break loose, to go

crashing down, taking more and more with it, till it was a regular landslide. After it had gone about 200 feet, a big billy sprang almost from under it. He made one jump, and landed on a rock 50 feet farther down, with all four feet together; and stood there unharmed, while the slide went by. He was evidently used to it.

Most of the guides testify that the Goat is so mountain-wise that he never gets caught. But there are occasional exceptions that have the emphasis of rarity.

W. Stephenson of Quesnel Fork, B. C., reports a Goat killed in a snow-slide in the mountains east of that town, in May, 1905,[57] and Col. G. O. Shields, when he studied the British Columbia snow-slides, in the spring of 1902, met with another case. Of this he has personally given me the following account: "Not far from my camp," he said, "was a small mountain-pasture in which was a White Goat that for several days remained in one spot. At last my curiosity was aroused. I got within easy rifle shot; and there, by the help of a powerful field-glass, learned that it had been seriously injured by some accident. Its face was badly cut and torn, and a section of its nose some six inches long, extending from about the eyes to the top of the nose, was an open sore. There was also a wound in one shoulder. I told Wm. H. Wright, the guide, that I thought it would be best to go up and see what the trouble was with this animal.

"We easily got within fifty yards of the creature, and found that the entire upper portion of its face had been torn off, and that the nostrils were exposed and bleeding. There can be little doubt that the carrying away of the Goat's face was done in some manner by a snow-slide, in which the Goat's head was held very firmly, while either a sharp-edged rock of large size, or a log, passed over it, grinding away skin and bone and laying bare the bottom of the nasal passage. There can be little question that as soon as warm weather and flies came, the Goat would die from the effects of its misfortune. Accordingly we crawled up, made several photographs of the Goat in various positions; then killed it, in order to put it out of its misery."[58]

Henry Bannon, writing of the Game Ranges of Klappan, British Columbia, says:

"From the Indians I gathered the latest stories about the game. Eight Goats were killed in the spring by a snow-slide on Ball Creek, a tributary of the Iskut River. There is no doubt that snow-slides in the north country cause a loss of much wild animal life."[59]

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[57]Campfires, p. 109.

[58]See also Campfires, p. 110.

[59]Forest & Stream, Sept., 1920, p. 485.

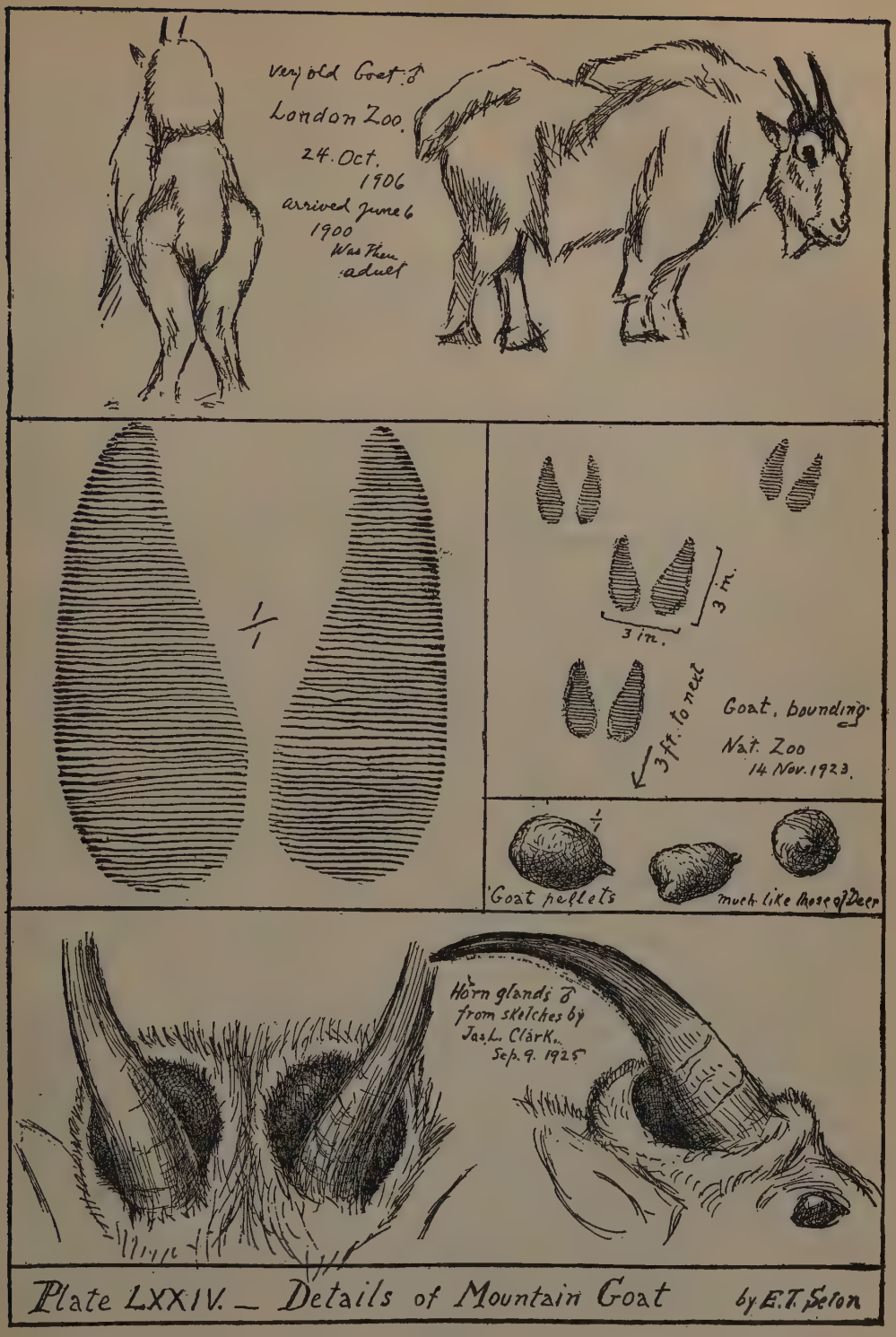

Plate LXXIV. — Details of Mountain Goat by E. T. Seton

A Calm White Hero

A hero is, of course, one who is not simply brave and wise, but who also is endowed with strength to back his courage and his wisdom. How brave and wise the Goat is, we have already seen; how strong, we may infer from the following incidents:

Walter Gibb, the guide of Glacier Park, tells me that on one occasion, with two other hunters, he ran a dozen Goats up a slide. At the top, they turned and rushed down again past the men, so near that one, a little fellow, Thomas Scott, seized a Goat by the hair. But it gave a bound, and escaped, throwing him some fifteen feet.

O. D. Hoor, a British Columbia mine-owner, relates that on Sept. 22, 1895, in the Trout Lake district, he had an adventure that shows the strength of a Goat. It had tried to cross the gulch. As soon as out on the level, two large Dogs and three men with axes attacked it. It could not reach the cliff and was handicapped by deep snow, but fought them off for half an hour before the 5 assailants killed it.[60]

Almost all hunters tell that when a Goat is cornered, he turns to fight, no matter how many or great his foes may be. At such a time, his manner is peculiar. First, he raises every hair on end, making himself look much larger and more terrible—exactly, indeed, as does his kinsman the Japanese Goat-antelope, that many of us have wonderingly watched in the Zoo. Next he snorts, puckers his lips, grits his teeth, sticks out his tongue, stamps and comes bouncing forward in little short, stiff, 4-legged bounds, like a bucking broncho. His head is low, and his two terrible little black bayonets are set for the charge—a charge which no Dog and no man could face without receiving a deadly wound.

In the section treating of "The Kid Mountaineer," it is told how a mother Goat fearlessly and successfully fought off the Dog to save her offspring.

B. T. Van Nostrand, of Brooklyn, describing the capture of the 5 kids for the New York Zoological Park, gives an idea of the power of a fighting mother Goat. As already noted, in the spring of 1905, Chapman and White, of Fort Steele, set out with 10 Dogs to round up a band of Goats in which were some kids. The Dogs rushed after the Goats, but the latter faced about and stood their ground; whereupon the Dogs closed in and tried to seize them. Instantly, before the assailants could sense the danger, the first two Dogs were stabbed to the vitals, and hurled over a precipice. It was done so quickly that no one realized what had happened until they saw

[60] Recreation, June, 1898, p. 437.

the Dogs mortally wounded and hurtling through air. The rest of the pack got the lesson, and held back. When the men came up, the Goats moved off. By rushing and manœuvring, the hunters were able to separate the kids from the band, and finally to catch 5.[61]

The climax, however, is contributed by Arthur B. Fenwick, a ranchman living near Fort Steele, B. C.

A full-grown billy Goat happened to stray out on the Joseph's Prairie where Cranbrook now stands.

"Old Chief Isadore, who was camped there, saw it. He and two other Indians thought that with Horses, Dogs and ropes they could catch the animal alive. I think fifteen Dogs left the camp for the Goat. A little later, a squaw saw that they were having a bad mix-up, and ran out to the Indians with a rifle. One of them shot the Goat. All but two of the Dogs were killed on the spot, or died very shortly. It was with the greatest difficulty that the Indians saved their Horses from getting punctured by those terrible little horns."[62]

Another amazing proof of valour unexcelled is contributed by Fenwick as follows: "A Goat will sometimes kill a full-grown Silvertip Bear! I once found a big Goat, dead, which evidently had been killed by a Silvertip, as there were lots of tracks all around, and the Goat's back was broken. I thought it queer that the Bear had not taken the Goat away and buried it, as usual, so I looked around. I found a large Silvertip Bear, dead, and all bloated up; and when I examined him, I found that the Goat had punched him twice, just back of the heart. He had been able to kill the Goat, and had then gone off and died."[63]

In an animal, subject to such vast variation, we must not expect a uniform high level of unshakable fortitude. John M. Phillips, of Pittsburgh, has had exceptional opportunities to watch the White Goats, and adds the following:

"The only time I ever saw a Goat really frightened, and show fear, was when Charlie Smith and I were hunting on the head of Wilson Creek, B. C. We had sighted a Grizzly-bear, and were following him up the side of a mountain and over the summit. It took us two hours to climb a distance that he covered in one. Near the summit, the Bear's trail led us through a little notch, and past the base of a pinnacle of bare rock, about 200 feet high, that ran up very much like a cathedral spire.

"Now it happened that as the Bear passed through the little notch,

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[61]Campfires, p. 122.
[62]As above, p. 121.
[63]As above, p. 122.

he frightened an old, long-bearded billy Goat, who immediately started up the pinnacle as hard as he could go, and climbed clear to its summit. And there the old fellow stood, or rather hung, in a most ridiculous attitude. His front feet were hooked over the eastern edge of the point, like a man looking over the peak of a steep house-roof, and holding on by his hands. His body and hind legs were well down on the other side of the pinnacle, and completely overhung a frightful precipice.

. . . . . .

"He moved his head in various directions, peering about, twisting his head, and squinting like a near-sighted man at a variety show. Four other Goats had taken to the high rocks on account of that same Bear."[64]

When He Fails

I do not know that the White Goat will be lowered—maybe rather he will be raised—in our esteem, if we learn that even this matchless mountaineer can and does, on rare occasions, make a costly mistake, a fatal error. We have heard how a kid slipped down a snow crack to be caught by the hunters; he, however, was just a kid. We have heard of a billy caught and mangled in a snow-slide—an enemy indeed, which nothing can foresee nor resist. Let us now hear of two sad accidents, that may beget a little sympathetic thrill.

While Goat-hunting in the Bitterroots in 1902, one of my guides, Louis Overturf, told me of this curious and tragic circumstance.

In the winter of 1885 or '86, he and his brother were out shooting on the Tincup Creek off Bitterroot Range. They went after a bunch of Goats. As Frank left Louis to go a different way with George W. Solider, they saw something odd-looking and white dangling from a tree that leaned from a high cliff. They soon made out that it was a Goat hanging there dead. Apparently, the Goat had walked out on the level trunk to browse—perhaps on the moss. On turning to come back, he had slipped; one leg went down between the trunk and a large branch with his body on the other side; so there he hung. The drop would have been a long way—perhaps 150 feet.

The most frightful accident of all, is that related by James I. Brewster, of Banff, Alta. While out with a hunting party in the early '90's, they were camped in the mountains northwest of Banff.

"They climbed to the top of a rugged mountain, and chased a band of Goats around its summit. The Goats went down over the edge of a rock

[64]Campfires, pp. 124–25.

wall which overhung so much that the animals could not be seen from above. Later on, when they descended to their camp in the valley, and looked up at the mountain wall, they saw their lost Goats, 5 in number, perched far aloft, on a narrow ledge. When night descended, the Goats were still there.

"The next morning, the hunters were surprised at finding that during the night the animals had not moved; nor did they move during that entire day. Then Mr. Brewster and his companions became convinced that the Goats had trapped themselves, and were unable either to go on or retreat.

"The band consisted of 2 adult Goats and 3 young ones. Naturally, it was the older animals that led the way into the danger; and it was the belief of the party that the adult Goats could not retreat the way they came because the young ones blocked the way, and were unable to go back. It was thought that the ledge was so narrow the Goats would not turn upon it, and the kids were unable to back out. We know that a young Goat can easily turn on a 12-inch ledge, provided the wall does not overhang; but an overhanging wall can make turning impossible.

"Mr. Brewster and his party became so interested in the fate of the trapped Goats that they remained in that camp long enough to witness the end of the tragedy. One by one, those poor Goats fell from their ledge, and were dashed to death on the slide-rock, hundreds of feet below. The hunters saw one of them fall; but the most of them fell at night. The last one fell on the tenth day after they took refuge on the fatal shelf."[65]

Oh, why did not the hunters use the merciful rifle when they realized the certainty of the trapped ones' doom! There is a time to grit one's teeth and calmly spill even innocent blood.

The Story of Fannin's Kid

As a character study, and a guide for those who would raise young Mountain-goats, I give this story from the experience and from the pen of John Fannin, the British Columbia naturalist.

It appeared first in *Forest & Stream*, Dec. 26, 1889, and was reprinted in the same periodical, Aug. 8, 1908 (pp. 211–12).

"About the 15th of May, 1881," he says, "an Indian came to my house, at Burrard Inlet, with the request that I would accompany him to his canoe and look at a *tenass mowitch* (small animal) which he wanted to sell me. I followed the old fellow down to the water, and stood by while he drew the thing out from the folds of an old blanket, and stood it on the beach. A little bullet-shaped head surmounted by a pair of tinv sharp-pointed ears, a mere

[65] Campfires, pp. 125–26.

handful of a body, propped up on four long and clumsy-looking legs, it was certainly the most ungainly animal I had ever seen. Its coat was of pure white wool, very short and slightly curly, and with very little appearance of hair except in the beard, which just showed itself beneath the lower jaw. There was no sign of horns, although slight protuberances could be felt beneath the skin where these would come. It was a male, and probably not over a week old; and the Indian had run it down on the side of a mountain after shooting its mother. I gave the Indian his price, $2, and picking the little waif up in my arms, carried it to the house.

"For two weeks, I fed it on cow's milk, weakened with water, feeding it about every hour, and allowing it only a very little milk at a time. Then, for a day or two, I added a little oatmeal to the milk; and before long, most anything of a vegetable nature was eagerly gobbled up by it. It appeared to be always hungry; but strange to say, it would allow no one to feed it but myself. It soon became a little troublesome, though, for, no matter where I went, the Goat followed at my heels like a Dog. At meal times, it would accompany me to the hotel and repose at my feet under the table. It would follow me into the woods on my short trips after grouse, and the report of my gun had little or no effect on it. If I climbed up on a stump and sat down for a smoke, the Goat would climb up too and sit down on its haunches by my side, and with its nose straight out in front, gazing solemnly into the gloom of the deep forest. So long as I kept quiet, it would remain motionless. The chirrup of a Squirrel or twitter of a bird failed to attract its attention in the slightest degree; but if I made the least motion to get down, it was up at once and ready for a spring.

"It had a great passion for high places which I imagine is born with the animal. When I first got it, I made a bed in one corner of the shed by filling a low box with clean, soft hay; the Goat standing by watching the operation. When it was finished, I picked him up and put him on the hay, pulling his legs from under him and making him lie down; in fact, giving him to understand that that was to be his bed. But as soon as I took my hands off him, he jumped out of the box. At the further end of the shed, which was about fifteen feet long, stood a pile of fir bark, six feet high, corded up in the usual way of cording fire wood. When he jumped out of the box he walked over to this pile and stood for a moment looking up at the top of it. Then he backed away from it till within a few feet of where I stood, and taking a run, climbed up that bark like a Cat; and lying down on the top looked at me as much as to say, 'This is the way we do in the mountains.' From then till the day he died, his bed was always on the top of that bark.

"He was an early riser, and long before my usual time of getting up,

he would rout me out by butting against the door. There were two domestic animals he could not bear the sight of—a Cow and a Dog. But while he would almost break his neck in the endeavour to get away from the former, the appearance of the latter aroused all the combativeness of his nature. One day a gentleman came into my shop accompanied by a setter Dog, when the Goat immediately assumed a belligerent attitude, walking around the room stiff-legged, his little hoofs coming down on the floor with a loud tap at every step. Finally he halted at a respectful distance from the Dog, and with his head lowered, bracing himself for a last effort, he seemed to be awaiting, or about to begin an attack. The Dog surveyed the little creature for a moment, and then, probably thinking it scarcely worth bothering with, lay down on the floor and went to sleep. As the Dog remained motionless, the Goat relaxed his rigid attitude and moved cautiously nearer, until, by stretching his neck, he brought his nose within an inch of that of the Dog. Just then a fly disturbed the Dog's slumbers, and in bringing up its paw to brush away the insect, it hit the Goat a sharp tap on the nose. Like the recoil of a steel spring, quick as a flash, the Goat sprang into the air, and in coming down and trying to alight as far away from the Dog as possible, he got tangled up in the legs of a wooden chair, which, in his hurry to get out of the house, he carried off with him. When he shook himself clear of the chair and looked round, and found that the house had not fallen, and that the Dog was perfectly quiet, he put on a look of utter disgust and skulked off into a corner of the yard where he lay down in a clump of weeds; and remained out of sight until the Dog was clear of the premises.

"As a general rule he was quiet, in fact, mopish; but when he did break out in a playful mood, some of his tricks were simply ludicrous. One day I was sitting with a friend in front of my house when the Goat, which had been cutting up pranks, evidently for our amusement, came and lay down at my feet. The cutting for the stage road, which ran past the house about fifty feet away, had left a steep bank of five or six feet high; that is, the road was so much lower than the plot on which we were sitting, Presently the Goat got up, and walking over to the edge of this bank, stood looking down this miniature precipice to the road. Suddenly he sprang into the air and pitched headforemost down the bank. I ran across, expecting to find the little brute with his neck broken, instead of which he was standing at the bottom shaking the sand out of his eyes and nostrils. When he got through, he climbed up the bank; and turning round, performed the same act again, turning a complete somersault on the way down. He did this about half a dozen times, occasionally throwing himself on his side and rolling down, covering himself from head to tail with dirt and sand.

"I allowed him the full liberty of the house; in fact, I could not control him, and it was this unlimited freedom that cost him his life. He was always with me in my work shop, and would always jump up on my bench, and stand sagely watching every movement I made. He had a great habit of picking up and chewing everything he came across; and one day he did this with one of my poisoned bird-skins. He had taken the skin outside the house, and the first I knew about it was when the little fellow came running through the door toward me, and fell before he quite reached me. I suspected what was the matter, and lifting him up poured some sweet oil down his throat, but he died in about half an hour."

He had lived in captivity for about two months.

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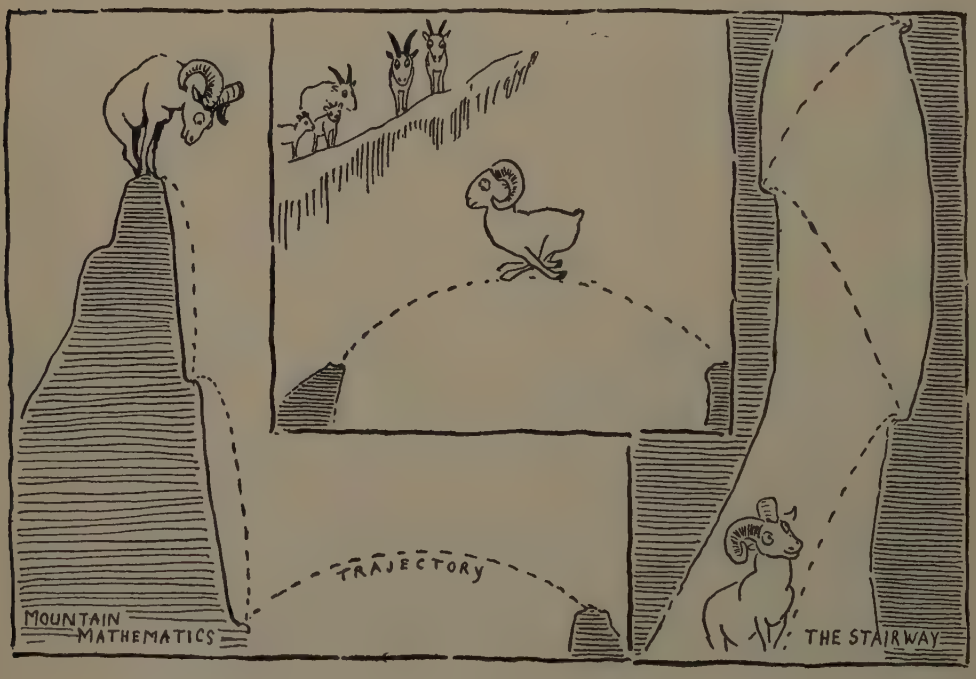

The Bighorn, Mountain Sheep, Brown Bighorn, Rocky Mountain Argali, American Ibex, Tayé, Wild Sheep of California, Mountain Ram, Deer-sheep, Sheep-deer, Thick-horned Sheep, Curl-horned Sheep

Ovis canadensis Shaw

(L. *Ovis*, a Sheep; *canadensis*, because it was first described from the Canadian Rockies)

Ovis canadensis Shaw, 1804, *Naturalists' Miscell.*, Vol. 15, Feb., pl. 610.

Type Locality—Mountains on Bow River, near Exshaw, Alta.

French Canadian, *Bélier Sauvage de Montagne*, *Grosse Corne*, *Cul-blanc*.
Mexican, *Cimarron*.
Hopi, *Pang-wuh* (Mearns).
Crow, *Is-pwir-té-té*.
Slave, *Sass-sei-yewneh* = Foolish Bear (Richardson).
Cree, *My-attick* = Ugly Reindeer (McGillivray).
Blackfeet, *Emo-ki-canow* (McGillivray) *E-mah-ki-kin-i* = big-head (Grinnell).
Mandan, *Ahsahta* (Lewis & Clark).
Ogallala Sioux, *Ta-hin-cha Sunka-la* (Dr. J. R. Walker).

The genus *Ovis* of Linnæus, to which this animal belongs, are ruminants of the Sheep type. They are large animals—most of them larger than the domestic Sheep—stoutly built, with medium or short legs; ears, small and pointed; tail, short, pointed, and without a tuft on the end; feet, with 4 hoofs each; snout, with small naked place between the nostrils; chin, without beard; glands between toes and under the eyes; mammæ two; horns in both sexes, those of the ram very large and massive, sweeping back, round, and up again in a noble curve, and bearing, besides many wrinkles, a rugged cross ridge for each year of his age. The horns of the ewe much smaller and nearly straight.

Teeth: Inc. $\frac{0-0}{3-3}$; can. $\frac{0-0}{1-1}$; prem. $\frac{3-3}{3-3}$; mol. $\frac{3-3}{3-3}$ = 32

When the Bighorn is seen wild in its native surroundings, the first impression is of a Deer with ram's horns. In colour, it seems all over, of a dull grayish brown, with white nose and stern.

A closer view shows that it has a blackish tail whose colour is joined to the brown of the back, by a long dark stripe cutting the rump patch in two; and that it wears white stockings with dark front facings.

Size. A ♂ from Wiggins Fork, Wyo., Sept. 21, 1906, No. 27393, Am. Mus. Nat. Hist., measures:

Length, 6 ft. 5 in. (1,953 mm.); tail, 5 in. (127 mm.); hind foot 15½ in. (394 mm.).

For the benefit of sculptors and taxidermists, I give fuller measurements of a fine ram that John Muir got near the Modoc Lava-beds northeast of Mt. Shasta:

Length from nose to root of tail, 5 ft. 10½.; length of tail, 4½ in.; height at shoulders, 3 ft. 6 in.; girth of chest, 3 ft. 11 in.; length of ear, 4¾ in.; length of horn around the curve, 33 in.; girth of horn at base, 16 in.; tip to tip of horns, 29½ in.

The ewe is much smaller than the ram.

A large ♀ in the American Museum measured as follows: Length, 5 ft. (1524 mm.); tail, 5 in. (127 mm.); hind foot, 15½ in. (394 mm.).

A more representative ewe which I collected on Eleanor Creek, in the Wind River Mts. of Wyoming, Oct. 6, 1898, was as follows:

Length, 4 ft. 6 in. (1,369 mm.); tail, 4¾ in. (120 mm.); hind foot, 15½ in. (394 mm.); length of head, 11⅝ in. (295 mm.); height at shoulders, 34 in. (862 mm.); from breast to ground, 17½ in. (445 mm.); from hock to ground, 14 in. (355 mm.); girth of chest, 40½ in. (1,027 mm.); girth of belly, 46¼ in. (1,172 mm.); from point of snout to base of ear, 10¼ in. (260 mm.); length of eyeball, 1 in. (25 mm.); length of ear, 5 in. (127 mm.); width of head through the eyes, 6¼ in. (158 mm.).

Weight. Clarke Fisk sets the weight of 2-year rams at 110 lbs.; of 3-year-olds at 170 lbs. According to all available testimony, 300 lbs. is about the average weight of big, that is, 6-year-old rams. John M. Phillips's heaviest British Columbia mountain ram weighed 316 lbs.[1] Audubon gives the weight of his fine ram at 344 lbs., of which the horns were 44½ lbs.[2]

The ewe whose dimensions he gives on the same page, weighed 240 lbs.; which is surprising. But Audubon is Audubon, so we must accept it, even though at times Audubon be Bachman, which is equally good.

[1]Personal letter.

[2]Q. N. A., II, p. 165.

PLATE LXXV.—BIGHORN SHEEP IN WASHINGTON ZOO

1. Ewe and yearlings. 2 and 4. Full-grown Rams. 3, 5, 6. Young Rams in the so-called "Ibex" stage

Photographs by E. T. Seton

The full-grown ewe which I secured Oct. 6, 1898, weighed only 136 lbs., and a second taken the same day, a 2-year-old, was 103½ lbs.

Colour. In early autumn, the proper season of the sportsman's interest, the Bighorn's coat is short, smooth, and dark.

The late September Wyoming ram, whose size has been given, is, in general colour, of a soft brownish gray which is much darker and becomes of a dark caribou-gray on the nape, throat, chest, armpits, legs, and tail; also on the band that joins the tail and back. In this gray, there is an almost purplish tinge. The snout, space about each eye, ear-linings, rump-patch, horns, scrotum, belly, a band down the inner back side of each leg, and another down the back edge of each hind leg, is *yellowish white.* On all four feet, the white band runs onto the outer toe, leaving the inner one dark. Three well-marked colours it shows—brownish gray, purplish gray, and dull white.

A Cascade Mts., B. C., specimen, ♂, Dec. 7, 1889 (A. M., No. 14478), is quite similar in pattern, but in general of a warmer brown and deeper tone.

The horns are of a dark umber brown; the hoofs black, and the eyes in all adults of a beautiful pale amber or golden yellow. In the lambs, the eyes are brown.

Some specimens have the white of the snout expanded so it covers the whole face; and in some, the back stripe does not cross the stern patch to the tail.

Sheep are darkest in late summer and early autumn. The hairs are darkest at the tip, and lighter and grayer toward the base; the bases of those on the head being nearly white. By December, the coat begins to fade a little from exposure. It also becomes brittle as it ages, so that the combined result of the fading and wearing off of the dark points is continuously to lighten the animal's colour. The face gets much hard rubbing in feeding, so that the white roots of the hair are more or less exposed by the springtime. Many have the face pure white by February, when May comes, the process has gone so far that many Sheep look white at a distance; and have thus given rise to the report of Mountain Goats in Colorado. In June, the old hair is shed; and in their new, sleek, short, August coats, they are once more of a rich brown. This hue, however, is subject to much variation, some specimens being slaty, and some very dark umber.

At this time, the ram looks very slim, sleek, and deer-like; but the lengthening of the hair and thickening of the fur, combined with the general fleshing of his body as the cool weather approaches, give him quite a burly, thickset, and massive look by early winter.

In colour, the ewe is much like the ram, but paler and of less emphatic

pattern; In several examined, the tail stripe did not cross the white stern patch.

Her changes of coat are like his.

A discussion of the horns appears later.

Races

Ranging as it does from the arctic regions in Alaska almost to the tropical on the point of lower California, the Bighorn is unique among our Big Game. Since it inhabits so many faunal areas, it has, of course, split up into a great many geographical races, and maybe several species.

Extreme splitters have made 5 or 6 separate species. Extreme lumpers, especially those of the English School, make only one species, *Ovis canadensis;* of which all the rest, even the Kamchatkan species *nivicola*, are listed as mere geographical races. Amid such diversity of opinion, it may be well to keep the middle of the road, and treat the American Bighorns as two super-species: The heavy-horned, Rocky Mountain Bighorn with its 10 races, and the slender-horned, Alaskan Sheep with its 5 races. The latter is treated in a separate Life.

The following are the recognized races of the Rocky Mountain species:

canadensis Shaw, the typical form as described. T. l., near the site of Banff, Alta.

auduboni Merriam, a large animal with the largest teeth of all the group. Horns narrower and longer than in *canadensis*. T. l., Badlands of South Dakota.

californiana Douglas, like *canadensis*, but much darker in colour. T. l., near Mt. Adams, Wash.

mexicana Merriam, large; ears nearly double the size of those of *canadensis*. In colour, darker than *nelsoni*, lighter than *canadensis*. T. l., Lake Santa Maria, Chihuahua, Mexico.

nelsoni Merriam, a desert form; small and very pale, with rump-patch crossed by dark tail line. It looks remarkably like a pale edition of the Black Sheep (*stonei*) of the Liard country. T. l., Grapevine Mts., east edge of Inyo Co., Calif.

sierræ Grinnell, like *nelsoni*, but larger, with shorter ears and tail; coat grayer and heavier; horns at base, round instead of triangular. T. l., east slope of Mt. Baxter, Sierra Nevada, Calif.

gaillardi Mearns, a small race like *nelsoni*, but darker; without white nose; feet, small; horns 2 or 3 in. apart at the base instead of nearly touching, and strongly incurved. T. l., between Tinajas Altas and Mexican boundary line, Ariz.

cremnobates Elliot, much like *nelsoni*, but paler. T. l., Matomi, San Pedro Martir Mts., Lower Calif.

texiana Bailey, a pale form; between *canadensis* and *mexicana* in colour; with narrow muzzle bones and heavy dentition. T. l., Guadalupe Mts., El Paso Co., Texas.

sheldoni Merriam, a dwarf form from Colorado Desert, T. l., El Rosario, northern Sonora, Mexico.

History

When Coronado, on his famous journey, reached Cibola in 1540, he wrote (Aug. 3) to Mendoza, the Governor of Mexico, a long account of the place and its products. The following is an extract:

"They have many animals—Bears, Tigers, Lions, Porcupines, and some Sheep as big as a Horse, with very large horns and little tails. I have seen some of their horns, the size of which was something to marvel at."[3]

This is the first record in our histories of American Bighorn Sheep seen by Europeans.

Over 150 years later, that is, in 1697, Father Juan Maria de Salvatierra crossed the Gulf of California, from the mouth of the Yakui River to the California Peninsula—then supposed to be an island. He was soon joined by Father Francis Maria Piccolo. They established missions during the following five years of their sojourn there, at various points from about latitude 26° southward to La Paz. It was in this region that they became acquainted with the Tayé, or Mountain Sheep, as recorded by Father Piccolo, the historian of these missions.

After a year or so, Father Eusivius Kino discovered that this "California" was not an island; and on February 10, 1702, the fact, with a map and description, was published by Father Piccolo. In it was an account of the Tayé or Mountain Sheep. It is here quoted in full, for it is the first detailed appearance in print of the American Bighorns; and is, further, "the source of all subsequent accounts of Sheep in California, based on the records of the early Jesuit missionaries.

"Besides several sorts of Animals that we knew, which are here in plenty, and are good to eat, as Stags, Hares, Coneys, and the like; we found two sorts of Deer, that we knew nothing of: We call them Sheep, because they somewhat resemble ours in make. The first sort is as large as a Calf of one or two Years old: Its Head is much like that of a Stag; and its Horns, which are very large, like those of a Ram: Its Tail and Hair are speckled,

[3]Winship's Coronado, 14th Ann. Rep. Ethno., p. 560.

and shorter than a Stags: But its Hoof is large, round, and cleft as an Oxes. I have eaten of these Beasts; their Flesh is very tender and delicious. The other sort of Sheep, some of which are White and others Black, differ less from ours; they are larger, and have a great deal more Wool, which is very good, and easy to be Spun and Wrought.'"

Thus, the "California" where the Tayé was found in 1697, was the peninsula of Lower California. The California of to-day had not at that time become a field of missionary enterprise; was, indeed, entirely unknown.

It is interesting to note that the Mountain Sheep occupy those very same hills to this day.[4]

This account by Piccolo continued, for about 100 years, to be the only published information about the Bighorn; and it is amusing now to recognize its unacknowledged offspring in most of the published natural histories that treated American game animals during the next two centuries. Each succeeding recorder simply made his own dilute of this, the original account.

The best known of these conscienceless writers was Father Miguel Venegas, a Mexican Jesuit, who in 1758 published his "Noticias de la California" (of which an English edition in 2 vols. appeared in 1759, called "History of California"). In this Venegas repeats Father Piccolo's account, but adds a picture of the Bighorn which he calls "The Tayé or Californian Deer," Tayé being its name in the Monqui tongue. This engraving is produced herewith ($2\frac{3}{4}$ x $3\frac{1}{4}$, original size). It is doubtless the earliest representation of the species. (Plate LXXVI.)

Some eighty years later (1784), Thomas Pennant, in his "Arctic Zoology," included the Argali among his American animals, citing the above missionaries as his authorities.

In the fall of 1800, Duncan McGillivray, a clerk in the service of the North-West Fur Co., was on the headwaters of the Bow River (near where Banff now is) with David Thompson, the famous explorer. While hunting, he came on a small herd of Bighorn. He recognized them as a new species of animal; and being a man of understanding, he sent a specimen to the Royal Society of London, where it arrived in 1803, and was promptly named and described by nearly everyone in the world of zoology.

Dr. George Shaw, however, managed to get his name published first; so it stands to-day *Ovis canadensis* Shaw, Feb., 1804. This was followed by *Ovis cervina* of Desmarest, March, 1804; and then by *Ovis montana* of Schreber, April, 1804. These facts, established by Dr. Wilfred H. Osgood,[5]

[4]Allen, N. A. Sheep, p. 19.

[5]Proc. Biol. Soc. Wash., Feb. 2, 1914.

PLATE LXXVI.—THE TAYE OR CALIFORNIAN DEER

Earliest known picture of Bighorn
From Venegas' "A Natural and Civil History of California,"
Madrid, 1758.

PLATE LXXVII.—MASSIVE HEAD OF BIGHORN IN COLLECTION OF MACKAY & DIPPIE OF CALGARY

The skull and horns weigh 43½ lbs.

have set at rest the question of the creature's scientific name and its godfather.

The story of McGillivray's hunt appeared first in the New York *Daily Advertiser*, Dec. 4, 1802. It was reproduced in several other periodicals, especially the New York *Medical Repository*, Vol. VI, 1803, pp. 238–40.[6]

After this, other travellers reached the Far West. Each of them added a little to our knowledge of the Bighorn, till now that it is threatened with extinction in the United States, we have achieved a very comprehensive knowledge of its habits and ancient homeland.

Horns and Record Heads

The marvellous curling horns of the rams were apparently the first things to catch the eyes, and rivet the attention of these early historians. Without exception, they comment on them.

The horns of the ram are the coveted trophy of the sportsman; for they are the creature's peculiar gift and crowning glory, his one distinguishing and imperishable ornament, the record of his size and of his life.

The illustrated series shows how the animal's age is notched on his horns. Only a ram who has had a superbly successful life, can show such horns as are represented in Plate LXXVII. He must have been a noble animal, gifted at the outset with a robust constitution; or he could not have grown them so massive. To have outwitted his enemies long enough to have achieved that length, he must have been wise and crafty above his kind.

A horn that measures 36 in. around the outside curve, from base to tip, and 15 in. in girth at base, must be considered in the highest class.

In Rowland Ward's "Records of Big Game," 1922 edition (pp. 383–84), are 36 that are more than 36 in. in length; 14 of these are of 40 in. and over; 21 are 16 in. or more in girth.

A record for length is 49 in., with a girth of 16 (owner's measurements). It was taken on the Clearwater of Idaho; it is owned by J. Simpson. A good second is J. B. Marvin's Alberta head measuring: Length, 48 in.; girth, $18\frac{1}{8}$ in.; spread 23 in. (owner's measurements).

The record given here for girth is a British Columbian head of 19 in. with a spread of 15; but the horn is only $36\frac{3}{4}$ in. long (owner's measurements). The owner is C. H. Kennard.

The best head measured by Rowland Ward himself was taken in Alberta by H. E. Knobel. It measured: Length, $42\frac{1}{2}$ in.; girth, $18\frac{1}{4}$ in.; spread, $22\frac{3}{4}$ in.

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[6]See also Dr. J. A. Allen's paper, in the references.

In *Forest & Stream* for June 1, 1895, the following notable heads are recorded by the Boone and Crockett Club Committee, who examined and measured them:

Geo. H. Gould, length, 42½ in.; girth, 16¼ in.; spread, 25¾ in.; Lower Calif.
G. O. Shields, length, 37¾ in.; girth, 16¼ in; spread, 22½ in.; Ashnola, B. C.
C. G. Gunther's Sons, length, 33½ in.; girth, 17¾ in.; spread, 21 in.
Theodore Roosevelt, length, 29½ in.; girth, 16 in.; spread, 18½ in.; Little Missouri River, Sept., 1887
T. W. Fraine, length, 30 in.; girth, 16 in; spread, 26 in.; Purchased from a dealer.

On July 7, 1906, I received from Belmore Brown of Tacoma, the details of 3 remarkable Mountain Sheep heads that he had just examined in the collection of W. F. Sheard.

1st Rt. Horn 43 in. long; 17⅜ in. girth (about 6 in. broken off the tip)
Lt. Horn 43¾ in. long; 17¼ in. girth
2nd Rt. Horn 38½ in. long; 17½ in. girth
Lt. Horn 35 in. (broken off) 17⅝ in. girth
3rd Rt. Horn 34⅜ in. long; 17½ in. girth
Lt. Horn 35 in. long; 17⅝ in. girth

The following are recorded in Rowland Ward's book (p. 384). All are owner's measurements.

Length on front curve	*Girth*	*Spread*	*Place*	*Owner*
49	16		Clearwater	J. Simpson
48	18⅛	23	Alberta	J. B. Marvin
47⅝	16⅛	23	Do.	W. Grant Mackay
45½	14½	22	Do.	J. D. Hazen
45½	16		Near Banff	J. C. Phillips
44½	17	21	Near Golden, B. C.	Madison Grant
43⅛	16¾	18½	British Columbia	Wilson Potter
42½	16¼	25¾	Lower California	Am. Nat. Coll.*

*Taken by Geo. H. Gould, Oct., 1894.

Baillie-Grohman records that out of 70 or 80 Bighorns that fell to his gun, the largest was a ram whose horns were each 19 in. in girth.[7]

[7]Camps, p. 161.

Rufus B. Sage writes that not far from Long's Peak, Nov. 10, 1843, he killed 2 Sheep whose horns were 19 in. in girth and nearly 3 ft. long. But he does not produce the specimens.[8]

Dr. W. J. Holland of Pittsburgh has a head that is, at least, in the record class, if not at the head of it. In 1910 I saw and examined this. It is as follows:

Right horn 43 in. (both horns had lost 2 or 3 in. by a break); girth, 17. These measurements were taken between 25 and 30 years after the specimen was shot, so the doctor is undoubtedly right in claiming for them an original basal girth of 18½ or 19 in. This ram was killed by Howard Eaton in the Badlands in Oct., 1880.

John M. Phillips of Pittsburgh writes me that he has a head whose horns measure but 17 in. in girth now, but which measured 18½ when worn by the living ram; and he is of the opinion that the horns of the Holland head were fully 18½ in. in girth originally. A final claim for the ram record is made by August Gottschalck on behalf of his Montana armoury head now in the possession of Fred Klein of Hoopeston, Ill. Length, 41 and 41¼ in., girth, 17⅜ and 18½ in., spread at points, 18¾ in.; weight dried 30 lbs.

A ewe taken by John Muir northeast of Shasta near the Modoc lava beds, had horns that measured 11½ in. long, and 6 in. in girth each. This appears to be near the record for a female, as the longest in Ward's book is 10½, with a girth of 5½.

A ram's horns should be measured as soon as secured. Horns shrink surprisingly as they dry out. In one year they will shrink an inch to an inch and a half, that is 5 to 10 per cent. in girth; somewhat but not so much in length.

The big ram taken by N. Hollister in the Mt. Robson region, mid-September, 1911, had a horn girth of 17⅞ in. in the field, but only 16½ in. when it got to the Museum. As these were careful measurements with a steel tape, it shows how much the horns may shrink in 7 months.

These facts shed light on some apparent inconsistencies. In perfect good faith, some sportsman announces that he secured a pair of 19-in. horns 10 years ago; and when the doubting critics apply the tape, and find them but 17½ in., the sportsman is unfairly put in a wrong light.

Weight of horns. Audubon's great ram head weighed 44½ lbs. Geo. F. Dippie, of Calgary, showed me one that weighed 43½ lbs. L. L. Dyche

[8]Rocky Mt. Life, p. 347.

says: "The horns and skull of the largest Sheep I ever saw, weighed, when thoroughly dry, 28 lbs."[9]

The Horns and Old Age

When one examines the horn-rings—the yearly notches on a ram's horns—one is struck by the fact that all the best horns have but 7 or 8 years' growth. After that, what?

It seems that the apex of vigour is then reached; for thenceforth the mighty masses that commanded success in the battle for wives and descendants, are become a burden with nothing to offset their weight. How gladly would the ram shed this useless load of junk if he could; and, like some Elk who is past his prime, wear a modest headgear—one reflecting more accurately his powers.

A quaint and partly true picture of the old ram, encumbered and handicapped by the glory of his youth, is offered by Alexander Henry, the garrulous old fur-trader and explorer who loved to handle a pen almost as much as he did a gun or paddle. On page 697 of his famous Journal, when in the land of the Kootenay, 1811, he wrote:

"At Rivière du Meurleton (Mirliton) we saw a herd of . . . old rams with enormous horns; one of them appeared to be very lean, with extraordinarily heavy horns, whose weight he seemed scarcely able to support. When the horns grow to such a great length, forming a complete curve, the ends project on both sides of the head so far as to prevent the animal from feeding; which with their great weight, causes the Sheep to dwindle to a mere skeleton and die."[10]

Broken Tips

The points of the Bighorn's horns are rarely entire; most have some inches missing. E. H. Ober maintains that this is caused by the horns being used to dig out roots among rocks, especially in seasons of drought, at which times in the Piute country, the sequaw root furnishes drink as well as food.

He says, further, that, as a consequence, "It is a very rare instance, indeed, to ever find a desert Nelson Sheep ram, in this locality, which has not the tip end of one or both of its horns broken; and it is an equally rare occurrence to find a Sierra Sheep with other than a perfect set of horns."[11]

Charles Sheldon, however, does not accept this. He tells me that he

[9] Campfires of a Naturalist, 1893, p. 145.

[10] Journal, II, p. 697.

[11] Pac. Coast Golf and Outdoor Sports, Jan., 1913, p. 26.

is sure that it is the combat of the males that breaks the horn tips. They are splintered by the terrific jar, even when the tips themselves do not actually strike in the fight.

And it would surely be very unfair to the ewes if they could not dig up a drink, as well as the rams.

An Hermaphrodite

Baillie-Grohman assumes responsibility for the following:

"It was the good fortune of one of the men to kill, three years ago, an hermaphrodite Bighorn, with very singular horns. Passing twelve months afterwards, near the place where he killed it, I was anxious to secure the head, but it was gone; Coyotes or Wolverines having probably carried it off. According to the description given to me, the horns resembled those of a two or three year old Ibex, lacking, however, the 'rings' peculiar to the latter's headgear."[12]

In this connection, it is well to remember also that the legend of the "American Ibex" or Straight-horned Sheep is founded on nothing more than the ewe, or sometimes the 2-year-old ram, of the Bighorn.

Horns on Trees

It seems that at one time, it was the custom of the Indians to hang Sheep horns on trees—to mark the spot—to make a kind of monument. I remember hearing a tradition that the hunting grounds of the Blackfeet were demarked from those of the Shoshones by a "horn-tree."

Two such trees have been cut down, and the embedded horns added to collections of the curious. A picture of one appears in *Forest & Stream* for April 11, 1896, with this notice:

"I send you photos of a Big-horn head imbedded in a large green, quaking-asp tree, found on Porcupine Creek—tributary of upper West Gallatin River—Gallatin County, Mont. The tree was near a rocky ledge or wall. As you will notice on the photo, the skull is completely imbedded." (Aug. Gottschalck, Bozeman, Mont.) (Plate LXXX.)

On Jan. 28, 1914, I saw in the store of J. P. Evans of Livingston, Mont., a horn-tree with two pairs of ram's horns embedded in the wood.

Glands

An obscure but interesting feature is the gland that is found under each eye. It secretes an unctuous, waxy stuff with the peculiar sheep-

[12]Camps, p. 420.

smell of the race quite strong. It probably has to do with a system of smell signals. The gland, with the corresponding depression in the bones beneath it, is much more developed in the Asiatic Bighorns. This further advancement of Eurasian species, compared with those of smaller areas, seems to be a law.[13]

Pads

Another detail of the Bighorn equipment for the life battle was observed by Bailey among the Sheep of Texas.

He says: "Among other peculiarities noticed in the fresh specimen are the pads of the breast and the knee, where the skin had developed to an almost cartilaginous shield over a quarter of an inch thick, and so hard that it was not easily cut through with a sharp knife. The whole sternum and front of the knees were thus protected, and for very evident reasons.[14]

Hitherto, the Camel has been supposedly the inventor and exclusive wearer of the rubber knee pads. But, after all, the Texan Sheep lives in Camel climate; so why not Camel fashions?

Domestication and Hybridity

All available evidence seems to show that the Bighorn might be easily domesticated. Yet so far as recorded, no one has done it, or even tried it; except, perhaps, in the Washington Zoo where the experienced head keeper, W. H. Blackburne, has bred and raised a number of lambs.

In the N. Y. Zoological Society 5th Annual Report (1901, pp. 114–15) is a brief note stating that Dr. Hyer of Halle-on-the-Saale, Germany, had succeeded in crossing Bighorn male with Mouflon female and vice versa, that the crosses are interfertile, and will breed with the domesticated Sheep.

Range and Haunts

Map VI shows the remarkable range of the Brown Bighorns, from north latitude 55° almost to the tropical region that puts a red tip to the southern end of the Californian peninsula. North of 55°, the Brown Bighorn is displaced by the Thin-horned group.

Over this immense area of 2,000,000 square miles, wherever mountainous, the Bighorn was plentifully distributed as late as 1870. Even such outlying groups as the Black Hills of Dakota, the Blue Mountains of Oregon, and the San Francisco Peak of Arizona, were fully stocked with the great Brown Sheep.

[13]See Evolutionary Force of a Wide Range, by E. T. S., Journ. Mamm., Aug., 1922, pp. 167–69.
[14]Texas, p. 73.

All the ancient records, and all the old-timers that I have consulted, tell that this creature was not originally a cliff-dweller. Its feeding grounds were the grassy foothills and bluffs not far from the crags. It would follow along the river bottoms to graze, but was ever ready to fly to the rocks for protection.

It was not gifted with speed, or weapons, or fighting strength; nor could it find shelter underground like so many of the otherwise defenceless. But this it had—the power to bound up a sheer and rugged cliff that was impossible to any other big creature in its range—except, perhaps, a Cougar or a White Goat.

To-day, all that is changed; the pressure of new perils has driven the Wild Sheep permanently to the high mountains. It is now a mountaineer. Nevertheless, it does, at times, set out across the level country to seek better forage. Its keen eye takes in mountains five to ten miles away; and the wise old ewe will strike out with her band, if she must, and make her way to the far, fair pastures she has spied out from some peak.

Another exception to the rugged upland habit, according to Baillie-Grohman, "occurs after rutting time when the rams, in very poor condition, will wander from their crags to the level plain land, where the rich bunch grass helps to recuperate their strength. Especially if snow has fallen on the higher ground will they be found feeding, sometimes as much as a mile from the base of the next mountain chain. I often saw, in the month of December, small bands grazing in this manner; but so watchful are they on these occasions—an old doe being constantly on guard duty on the most prominent knoll—that it is most difficult to approach them within shot."[15]

One other of the great forces of nature has been enlisted by the Bighorn; that is, thirst, the terror of the desert.

T. S. Vandyke tells me (Oct., 1899): "The favourite home of the Sheep is among the most rugged and arid of the desert peaks. It is absolutely impossible for man to follow them there. No matter what his strength, his skill, or his endurance, the still-hunter is worn out by the fearful heat and the excessively dangerous climbing among the slide rock and friable clay-bluffs long before he has a chance of success. The only way in which they are ever killed is by lying in wait at a water-hole, and murdering them as they come to drink."

And this is rarely done, for the Sheep come to this death-trap only in the hours of gloom; and in many parts of the desert, as will be seen, they have learned to dispense with water altogether.

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[15]Camps, p. 164.

Primitive Abundance

The early explorers of its region, mention the Sheep as often as they do the Deer. Though probably not to be compared in number with Buffalo, Antelope, or even Elk, there can be no doubt that the Bighorn existed in millions in palmy days of Coronado.

That enterprising, bigoted, but heroic and epoch-making traveller, tells of the Great-horned Sheep that he saw in his famous journey through Arizona and New Mexico in 1540; but does not say how numerous they were.

Lewis and Clark's first reference to the Bighorn—and presumably first sight of them—is when they reached the Yellowstone, May 25, 1805. From this on, there are numerous mentions. On May 28th, near the mouth of Judith's River, they saw "the Bighorn in great quantities, and must bring forth their young at a very early season, as they are now half grown."[16]

Next day they add, "There was a great abundance of the Argalea or Bighorned animals in the high country through which it [The Judith River] passes."[17] After this, for a time, the Bighorn was the most abundant of game.

All mention of them ceases after August 1st, and until April 12th when among the West Coast tribes, the Clakclellahs, near the mouth of Cruzatte's River. The next mention is June 2d, when, on the return journey, they were back to the Tommanamah or east branch of Lewis River. After which the Sheep once more abounded and became a staple of diet; especially about the mouth of the Bighorn River, where they remark that it was the abundance of these animals which gave the river its name.[18]

Their last mention of the Bighorn is when the travellers were near the mouth of the Yellowstone on their way back.[19] This was evidently the greatest of all Bighorn countries. Here we find a tribe called "the Sheep-eaters," who lived on the Sheep, as the Plains Indians did on the Buffalo. Here, indeed, we learn from eyewitnesses that the Bighorn existed in thousands.

Zebulon M. Pike mentions, in his "Exploratory Travels through Lousiana" (p. 218, 1889 ed.), that on Jan. 1, 1807, he "found on the way one of the Mountain Rams which the Doctor and Brown had killed and left on the road. Skinned it with horns, etc." But I find no other mention in his record.

[16] Exped., I, p. 249.
[17] P. 250.
[18] As above, II, p. 413.
[19] As above, II, p. 423.

PLATE LXXVIII.—THEIR WINTER HOMELAND, YELLOWSTONE

Photograph by E. T. Seton

We have no appraisal of the abundance of Sheep in the Southwest, that is Coronado's country, until we find that of J. O. Pattie, who crossed Arizona in 1825, and tells that, on Jan. 1st, he saw "multitudes of Mountain Sheep" on the banks of the San Francisco River, which rises near the same sources as the Helay, that is Graham Co., Arizona.[20]

On the Upper Platte near Sweetwater Hills in Central Wyoming, Capt. J. C. Fremont writes, July 30, 1842: "We saw here numerous herds of Mountain Sheep, and frequently heard the volley of rattling stones which accompanied their rapid descent down the steep hills. This was the first place at which we had killed any of these animals; and in consequence of this circumstance and of the abundance of these Sheep or Goats (for they are called by each name) we gave to our encampment the name of Goat Island. Their flesh is much esteemed by the hunters, and has very much the flavour of the Alleghany Mountain Sheep."[21]

Rufus B. Sage refers once or twice to killing Sheep in his exploration of the foothills west of Denver in 1844; but the inference is that they were less numerous than the Deer there.[22]

George F. Ruxton, writing in 1847, says of the Bighorn: "They are generally very abundant in all parts of the main chain of the Rocky Mountains."[23]

Newberry's account (1857) says: "On the slopes and shoulders of Mount Shasta, the *Ovis montana* exists in large numbers; so much so, that one spur of the mountain has been named "Sheep Rock"; and there hunters are always sure of finding them."[24]

W. H. Brewer found Sheep common on the mountains surrounding South Park in 1871, and states that they are particularly abundant above the timberline on the highest peaks.[25]

John Muir told me in conversation (Oct. 2, 1899) that the High Sierra from Whitney northward used to be full of Sheep. In 1874, they were numerous south of Rhett Lake, and common on Shasta. Sheep Rock used to be a common winter ground for them. Near Mt. Humphrey, on the San Joaquin River, he once saw over 40 in a flock.

Abe Leeds of Hamilton, Mont., was my guide in 1902. He was a reliable old-timer; and assured me that, in 1884, there were thousands of Sheep on the Lost River, which is an affluent of the Snake, and crosses

[20]Narrative, 1883, pp. 55–56.
[21]Explor. Exped. Rocky Mts., 1842, pub. 1845, p. 56.
[22]Rocky Mt. Life, 1857, pp. 347, 351.
[23]Wild Life in the Rocky Mts., 1916 ed., p. 207.
[24]Pac. R. R. Report, 6, 1857, Zool., p. 72.
[25]American Naturalist, V, 1871, p. 220.

the Red Desert of Idaho. Also in 1886, when, in the Bighorn country, Sheep were more plentiful than any other game, he had seen 500 in one day, usually in small bands of 15 or 20.

Prof. D. G. Elliott says that, in 1886, he made a hunting trip into Yale Co., British Columbia. Starting from Hope on the Fraser River, he crossed part of the Coast Range to Ashnola. He found great numbers of Sheep and Mule-deer. On one occasion, a procession of over 150 ewes, lambs, and small rams, all led by an old ewe, filed past him at 75 feet distance.[26]

W. R. McFadden of Denver, tells me that about 1892, he saw 57 ewes and lambs in a band on Crater Mountain in British Columbia, about 18 miles north of the Washington line.

M. W. Miner writes in 1897: "It is estimated there are between 2,000 and 2,500 Mountain Sheep, now inhabiting the slopes and mountains of the middle Fork of Salmon River, mostly in the vicinity of the upper end of the Great Canyon, which is about 60 miles from the main Salmon River. . . . Two trappers who wintered in that country last winter told me . . . it was almost a daily occurrence to see bands of 60 to 100 feeding on the bare hill sides."[27]

On Feb. 11, 1899 (p. 110), W. L. Simpson writes to *Forest & Stream:* "Some 400 head of Mountain Sheep, mostly ewes and lambs, are wintering on the Big Gros Ventre, Jackson's Hole."

Population in Those Days

Some idea of the primitive number of Sheep may be formed from the population in Glacier National Park. In 1916, I spent some weeks camping in the Park, and after using all sources of information, calculated that the 2,500 square miles of the Park contained not less than 1,500 Sheep. In the official Report[28] this estimate of mine was raised to 2,000, or about 1 Sheep to the square mile of this possible territory.

The Park is far from ideal range. It contains very little true Sheep pasture of the kind that they sought a hundred years ago. One can travel about a whole month, as I proved in 1916, and never see a Sheep. In the Big Horn Basin, judging by Lewis and Clark's accounts, and those of later travellers, Sheep may have been ten times as numerous as the above Park estimate. Offsetting this, however, is the sparse population of the arid desert regions. So that it is very safe to assume the primitive number

[26] Allen, N. A. Sheep, p. 25.
[27] Recreation, Oct., 1897, p. 301.
[28] Wild Anim. Glac. Pk., Dept. Int., 1918, p. 27.

at between 1,500,000 and 2,000,000. This, of course, does not include the Slim-horned Sheep of the north, whose numbers may be at least as great.

The Remnant about 1900

"The last Mountain Sheep was killed in Shasta Valley by George Conner on a Sunday morning in 1873."[29]

The Sheep were practically cleared out of the Black Hills about 1887, though according to Howard Eaton, a few lingered on till 1899, when the last one was killed.

G. B. Grinnell says: "W. S. Phillips has kindly informed me that about June of that year [1890] he saw 3 sheep on Mt. Inyan Kara."[30]

Prof. E. C. Bishop of Ames, Ia., assures me that in Aug., 1897, he saw 8 Mountain Sheep on Sheep Mountain, 50 miles northwest of Pine Ridge, and 50 miles east of Buffalo Gap. He got within 300 yards of them.

Edwin Carter, of Breckenridge, Colo., told me in 1899 that the few Sheep on Pike's Peak were all that remained in eastern Colorado.

Judge D. C. Beaman, of Denver, was less pessimistic. He told me (1899) that he believed there were yet Sheep in most of the Colorado Mountains; and that, thanks to protection, there were twice as many as ten years ago.

John Muir assured me that in 1899, there were still a few Sheep about Mt. Whitney and in the Yosemite.

In July, 1902, I spent some time at Pine Ridge, S. D., riding and camping with Dr. James R. Walker. He stated that Mountain Sheep were still found in the region—that there were 3 bands of less than a dozen each on the Indian Reserve. They frequented the impassable Badlands along White River. He showed me 4 specimen heads, and gave me the best of them; this I sent to the National Museum.

That same summer, I visited the Black Hills, and was assured and convinced that there were no Sheep left there then. The few that were still holding out in the Badlands were all that Sam Day, the taxidermist, had heard of for some time.

In 1902, Dall de Weese estimated the total number of Sheep in Colorado at 700.[31] In 1910, E. R. Warren wrote: "They are gradually increasing in number."[32]

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[29]Wm. Russell, Cal. F. & G., July, 1916, p. 125.
[30]Amer. Big Game, Boone & Crockett, 1904, p. 334.
[31]Merritt Cary, N. A. F., 33, 1911, p. 63.
[32]Mamm. Colo., p. 10.

In western Texas, Bailey was assured by an old resident of one of the canyons, a man who had supplied his table with wild mutton for many years, that he considered Bighorn fully as numerous at that time (1905) as fifteen years before.[33]

Present Numbers

In the Yellowstone Park, the Sheep, of course, hold their own. When I lived there in 1897, there were about 150 Sheep in the Park; in 1914, there were 210; and in 1922 there were supposed to be 300.

When I was in the Glacier National Park in 1916, I concluded from the evidence of the guides that there were about 1,500 Sheep within the boundaries. As already noted, these have steadily increased, and now number probably 2,500.

The estimate for 1915 was 7,230 Sheep in Colorado alone; that is, ten times as numerous as they were 20 years before.[34]

In California, also, an encouraging condition prevails. About 1900, I was assured that the Bighorn was extinct except in Lower California. Some few hunters believed that there was a scattered remnant in the Desert Mountains; but their extinction was practically accomplished. Then came the era of awakening, followed by good game laws, and a measure of enforcement as well as some sanctuaries; with the result that the Sheep are increasing in many localities.

E. H. Ober, Assistant Game Commissioner of California, wrote in 1915, that flocks amounting to over 150 had been seen recently on the eastern slope of the White Mountains, about 20 miles east of Independence. Homestake Canyon is their watering place during the summer months.

"East of Homestake Canyon," he continues, "and across Saline Valley twenty miles to Hot Springs, and around Sand Springs and Last Chance Mountain, Mountain Sheep may be found everywhere. Also on Ubehebe Mountain, lying east of Saline Valley, Mountain Sheep are very abundant, and south of Ubehebe Mountain for 100 miles; all through the Funeral, Argus, Panamint and Slate ranges of mountains, they abound. They are most numerous, however, in Inyo County, in the above-named mountains, and in and around 'Windgate Pass' and the Sheep Mountain country, and on the western slope of Tin Mountain northeast of Ubehebe Mountain.

"Directly east of Big Pine, about 30 miles, there is a very beautiful herd; the writer, on several occasions having seen as many as 40 at one

[33]Texas, p. 71.

[34]Boone & Crockett Report.

time. . . . Very reliable reports reach me concerning their splendid increase each year.

. . . . . .

"In the Sierras, running through Inyo County, there are three herds of Mountain Sheep [*sierrae*], and these are a distinct and much larger variety than the Desert Sheep. People generally are not aware of the existence of these Sheep, as they are found high up in cloudland, and above the localities frequented by man. The largest herd known in the Sierras can be found northeast of Independence, and about ten miles away; the writer has observed this herd upon many occasions, and their number is in the near neighbourhood of 85 to 90; 65 having been counted at one time this last winter, at the base of the mountains touching the valley, and within a stone's throw of an automobile road; thus refuting the popular notion that Mountain Sheep do not change their altitude, regardless of weather conditions.

"The herd next in size, may be found about twenty-five miles west of Bishop City, on Mount Tom; and numbers about 40 or 50 head."[35]

To this he adds:

"Last spring, while collecting some specimens for the United States Biological Survey, I was able to make a close study of one of the large herds of Sierra Mountain Sheep ranging north of Independence, Inyo County. I had previously estimated the number in the vicinity of Mount Baxter to be about 80; but during a two-weeks' trip, we saw at least 200 individual Sheep, and doubtless . . . many others [were] ranging in the near vicinity. Including the Nelson Mountain Sheep, which inhabits the desert ranges, there must be in the neighbourhood of 1,500 Sheep in Inyo County alone."[36]

Prof. Leon L. Gardner, writes: "That Mountain or Bighorn Sheep still exist in small bands in various parts of the California Mountains is a fact well known. It, however, comes as a welcome surprise to find them living, breeding and at least holding their own in numbers, in the mountains not farther than thirty miles from Los Angeles. Vague reports from old hunters that in certain parts of the ranges near Mount San Antonio, commonly known as 'Old Baldy,' there were 'Wild Goats and Sheep'; and that they were 'mighty hard to get near to,' furnished the incentive for investigations which have demonstrated that one species of Bighorn Sheep occurs in the ranges north of Claremont, Los Angeles County. Whether or not this is the Nelson Bighorn (*Ovis nelsoni*) is an open question which can be

[35] Forest & Stream, Oct., 1915, p. 228.

[36] As above, pp. 236–37.

decided only by the collection and study of specimens."[37] On June 12, 1915, he saw 3 Sheep near "Old Baldy."[38]

In Sept. 1914, he says, "a whole band was seen on Ontario Peak." On p. 20 he adds: "Regarding the numbers of Sheep living in this territory it is not possible to say definitely. If all the Sheep are in one band, then their number is between 50 and 60 head."

In 1912, Charles H. Townsend wrote that Sheep were still commonly found throughout the desert ranges of Lower California.[39]

In 1915, a committee of the "Boone & Crockett Club" of N. Y., made a valuable report on the number of Sheep still existing in America, as follows:

"In the fall of 1913, probably 3,000 or 4,000 or more exist in the Desert ranges of Arizona. Some still remain in the Santa Catalina Mts., north of Tucson. Though protected by a close season, prospectors, Indians, and others going into the mountains indifferently shoot them for meat. In spite of this, they are holding their numbers. More investigations in the Grand Canyon, corroborate the numbers suggested in the Committee's last report.

"In California, Nelson's Sheep exist in numbers in the mountains about Death Valley, and in less numbers along the lower Colorado River. Here, for thirty years the Sheep have at least held their own. In the high Sierras running through Inyo County, some 200 Sheep have been observed in different bands. There are probably many more. There are Sheep in the San Jacinto Mountains.

"Mountain Sheep were formerly abundant in the Warner Mountains and the Steen Mountains in south central Oregon, but a careful search in these ranges in 1914 failed to discover any traces of them—only vague reports of their presence. In limited areas in eastern Oregon there are still fair numbers of them in certain localities. In Nevada, small numbers exist in nearly all the desert ranges in the southern part of the State. Small numbers are also known to range in the Toiyabe range in central Nevada, in the east of central Nevada, near the Utah border, and perhaps in the extreme north central section. Sheep are being illegally killed in Nevada more rapidly than elsewhere. The conditions there are not hopeful for their survival.

"In Colorado, Sheep seem to be increasing, and in some parts of the State, have become extraordinarily tame, even coming down the moun-

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[37]Cal. F. & G., Jan., 1918, p. 17.

[38]As above, p. 17.

[39]Bull. Am. Mus. Nat. Hist., Vol. XXXI, Art. XIII, p. 119.

tain-sides in winter to feed in the towns and about the ranches with the Cattle. These Sheep may eventually afford a supply to restock other areas of the country. The Forest Service estimates that there are 7,230 Sheep in the National Forests of Colorado. . . .

"In Wyoming, Sheep are believed to be slowly increasing, especially in the north and south forks of the Shoshone River in the game preserve. In the Bonneville National Forest, the severe winters, poor winter range, and predatory animals seem to be causing a decrease. The Forest Supervisor there reports that he commonly finds Coyote tracks following the trail of Sheep in the snow. A small band still exists, and there are about 160 on the Big Horn Mountains. They appear to have become extinct with the last year on the Medicine Bow Peak. In the Yellowstone Park, the number is about what it was [300].

"A few Sheep still exist in Texas and New Mexico. For the present, Sheep should enjoy a close season everywhere in the United States. Large numbers of Sheep occupy the desert ranges of Lower California, extending almost the entire length of the Peninsula. Large numbers are found also on nearly all the ranges of Western Sonora, growing scarcer a hundred miles south.

"It is clear that, in the United States, desert Sheep hold their numbers better than the northern variety."[40]

W. P. Taylor, reviewing the 1916 Game situation in California, says, "At present the Desert Sheep is apparently increasing in some sections of its range, notably the desert ranges in Inyo County; and stationary or decreasing in others, as in the desert portions of the more southerly counties, San Bernardino, Riverside and Imperial. There are, fortunately, some large bands which promise well, and which at least indicate that there is no cause for concern over the immediate future of the species within the State."[41]

During the winter of 1921–22, I lived near Victorville, Calif., on the Mohave Desert. From the talk of the settlement, I gathered that Sheep were much more abundant than Deer, and easier to get. Dr. Harry Garcelon told me, indeed, that, Sheep were yet to be found in fair numbers, on all the surrounding mountains, especially the Ords, the Funeral Range, and the Calico Range. He had often seen them. About a year before, he saw a band of 12 or 14; and promised definitely that if I would come back in August when most of the water tanks are dry, he could show me 50 Bighorn Sheep within one week.

[40]Report, pp. 20–23.

[41]Scientific Monthly, Oct., 1916, p. 405.

In Utah, condensing the account of Claude T. Barnes,[42] there are 106 Sheep on the whole Uinta Mts.; about 25 head near Springdale, Washington Co.; about 400 in the Ashley Forest; a few on Granite Mt., Tooele Co., and a few along the canyons of the Green, Grand and Colorado rivers, especially along the Grand River near Moab,—probably a round 1,000 in the State.

The estimate made by the Biological Survey, of 10,000 as the total of Mountain Sheep in the United States in 1920,[43] seems to me obviously too low.

On the strength of the material presented here, supplemented by general information from hunters, and finally adding the official census figures of the game in the National Forests in 1922, I estimate the number of Sheep existing in the United States as follows:

Arizona	3,500
California	3,500
Nevada	500
New Mexico	500
Utah	1,000
Colorado	8,000
Texas	500
Wyoming (incl. Yellowstone Park)	4,000
Montana (incl. Glacier Park)	5,000
Idaho	1,500
Total	28,000

From all accounts, there are fully as many as that in northern Mexico, and lower California where the "Boone and Crockett" committee reports them in "large numbers."

In Canada and Alaska, where they continue in nearly primitive numbers, there must be fully, 2,000,000 Wild Sheep, all species included.

Home Range

The Sheep are very clannish. A certain flock roams on a certain upland, and although, at some seasons, the rams are apart, they are not on a different range. They seem to keep in touch with the herd, which is composed of ewes, lambs, and spike-rams; that is, those not yet arrived at full ramhood.

[42]Mamm. Utah, 1922, pp. 26–28.

[43]Bull, 1049, U. S. Dept. Agri., 1922, p. 24.

PLATE LXXIX.—THE RAM HERD OF YELLOWSTONE PARK

Photographs by E. T. Seton, Jan., 1914

Like all our Big Game in the snow-lands, the Bighorns have two ranges —one for summer and one for snowtime. The only direct observation I have to fix the extent of these, was made in Yellowstone Park, where something like primitive conditions have been restored.

There are two well-marked herds there that I observed, and followed about,—the Washburn herd of about 25, and the Mt. Everts of about 50. In the summer, they could always be found within 2 or 3 miles of their headquarters, which was the highest part of their not very high mountain. In snowtime, they descended much lower, and sought the sheltered hillsides.

The Mt. Everts flock is well known in winter along the canyon of the Gardiner River. These animals do not go two miles from the point halfway between Mammoth Hot Springs and Gardiner. The tenacity with which the Bighorn clings to its home range reminds one of the intense localism of the Highland clans. Charles Sheldon says of the White Sheep, that they live and die on their home range, and if driven off temporarily, return as soon as possible.[44]

One advantage of this attachment to their range is that the Sheep are thoroughly versed in all local conditions. Especially is this true of the old ewe who is their "bell-wether." She knows all the places of shelter from a storm; she knows where to find choice foods in time of scarcity; she knows every drinking place, as well as the salt-licks and the semi-salt-licks. Above all, she knows every trap, every jump-off, every sheep-ladder, every shoot that is possible for a Sheep, but beyond the powers of Wolves, Bears, Cougars, Dogs, or humans. Amply equipped is she, therefore, when pursuit becomes unpleasantly stimulating, to lead the swiftest foe on a fool's errand, to take excellent care of herself, and incidentally of those that have the wit to follow her.

Food

The Bighorn is a delicate feeder. When one sets in parallel columns the food-stuffs of Elk, Deer, and Bighorn, one is slightly shocked to see what a variety of crude, rough, woody, or rank-smelling and -tasting things the Deer folk will eat. The Bighorn, on the other hand, eats nothing but the sweetest and most delicate of hillside or mountain grasses and flowers. This rare combination of niceness with sweetness seems to bear fruit in the delicacy of its flesh.

Most of the close observing hunters describe the Mountain Sheep as strictly a grass-eater. A. A. Anderson tells me that in the Bighorn Basin,

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[44]Wilderness Upper Yukon 1911, p. 303.

the Sheep never browse; their food the year round is grass, even when they must paw for it under the snow.

Bailey, however, writing from Texas of specimens taken in early August, says: "The stomachs of the two Sheep killed were full of freshly eaten and half-chewed vegetation, and most of the plants composing the contents were easily recognized by the stems, leaves, and fruit. The leaves, twigs, and carpels of *Cercocarpus parvifolius* formed a large part of the contents, while the leaves, twigs and seed pods of *Philadelphus microphyllus* were present in less abundance. The seeds, stems, and leaves of the common wild onion of the mountain slopes were abundant and conspicuous in the mass, giving it a strong odour, while the black onion seeds, still unbroken and often in the capsules, were especially noticeable. A few bits of stems and leaves of grass were found in each of the stomachs, but they formed probably not over 2 per cent. of the total mass."[45]

A 7-year-old ram was taken soon after in Western Texas. Concerning its stomach he says:

"Over half of the contents was composed of the green stems of *Ephedra trifurcata*, which I at first mistook for grass, but which could not be mistaken on careful examination. The stems, leaves, and flowers of *Tecoma stans*, a beautiful yellow-flowered bush, were conspicuous, as also were the leaves, stems, and berries of *Garrya wrighti*. A few twigs with leaves and fruit pods of *Pentstemon* were found, and a quantity of ripe fruit of *Opuntia engelmanni*, including the chewed-up pulp and seeds of at least half a dozen of the large pear-shaped berries. Some other leaves and stems were found that I could not recognize, but a careful search failed to reveal a trace of grass in the stomach."[46]

Game Commissioner E. H. Ober, says that "their food consists of the tender shoots of growing brush, and their favourite dessert is the most delicate ferns and flowers."[47]

But Prof. Leon L. Gardner, of Pomona College, Calif., has given some details that are new and helpful. He says: "The following plants form an important part of the [Sheep's] diet: the leaves of the Chinquapin (*Castanopsis sempervirens*), a wild parsnip (*Palpinacea sativa*) growing around waterholes, berries of the manzanita (*Arctostaphylos*), twigs and leaves of *Rhus trilobata* and *Rhamnus crocens Californicus*, and finally grass growing near springs and streamlets."[48]

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[45]Texas, pp. 71–72.
[46]Texas, pp. 74–75.
[47]Forest & Stream, March, 1915, p. 228.
[48]Cal. F. & G., Jan., 1918, p. 20.

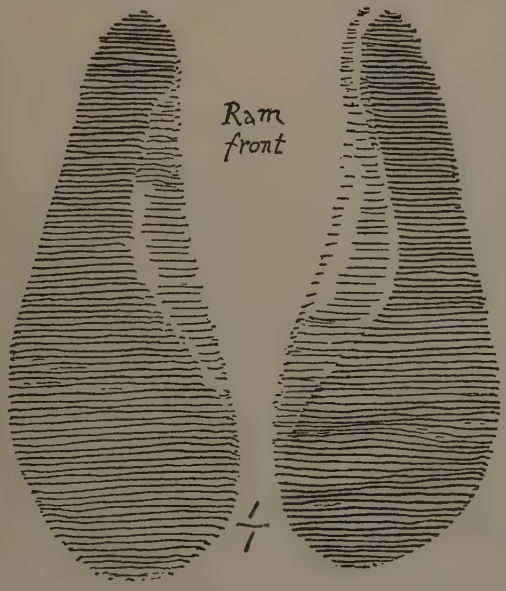
Horn-trees.

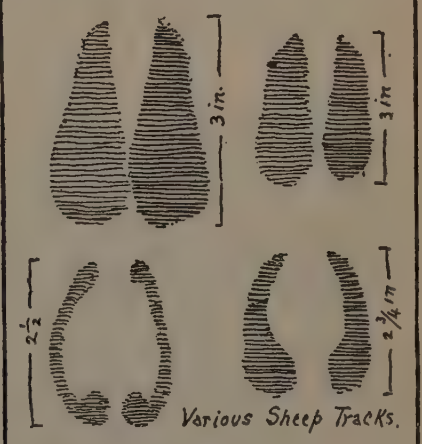
Collection of August Gottschalck.

Collection of J.P. Evans.

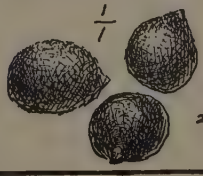
Yellowstone Park.

Ram Track. Jan. 25. 1914. E.T.S.





Various Sheep Tracks.



Pellets like those of Deer

about 1000 at one place.

E. T. Seton.

Plate LXXX. — Details of Bighorn. Tracks, etc.

The dwarf ram collected by Sheldon (March 10, 1916) in the Rosario Mts. of Sonora, was shown by the one unquestionable proof, to have eaten the following:

"Ground cherry (*Physalis*)—many seeds and a few husks; Joint-fir (Popotillo of the Mexicans, *Ephedra*)—two seeds and stems; Evening primrose (*Anagra*)—one woody capsule; Mallow (*Sphaerolcea*)—a few seeds; Brittle-bush (*Encelia*, two sp.)—stems, seeds, and heads common; Hosackia (*Lotus*)—one seed capsule; Spurge (*Croton*)—three seeds; Buckwheat bush (*Eriogonum*)—stems common; Bedstraw (*Galium*)—a few leaves and stems; Spiny bush (*Krameria*)—stems common; Iron tree (*Olneya tesota*)—leaves and stems common; Lichens—a few bits; Grass—no trace that Professor Hitchcock, the grass expert, could detect. More than half of the stomach contents is unidentifiable."[49]

Perhaps the answer to these apparent contradictions is that there was no grass in Texas, Arizona, southern California, and Sonora at the season indicated; and the Sheep ate whatever they could find. Or, it may be the observations in the North were faulty; for those of the desert alone, have the unquestionable testimony of stomach contents analyzed by experts.

In the Bighorn Basin, the metropolis of the Great-horned Sheep, the staples of their food are the delicate upland grasses; and mountain clover when they can get it.

Food in Captivity

It is very fitting that this account of the Bighorn's food be closed with information useful to those who have to feed him.

In 1917, Rudolf Borcherdt, of Denver, was allowed to secure for export some of the half-wild Bighorns that are now the pride of Colorado. After much advertising, he secured three—a tame ram, and, later, two wild ewes—and success seemed in sight.

"But now," he says, "my trials began. The Sheep had been in captivity only a week, and scarcely had touched food of any kind. I began to feed them the best of timothy and clover hay, also carrots and oats. The hay did not seem to suit them, but they would eat sparingly of oats and carrots. When I saw that timothy would not do, I tried alfalfa hay. This they seemed to like better, eating principally the leaves. But . . . dysentery set in, which almost became chronic. The Sheep lost flesh, and altogether looked a sickly pair.

"Finally, I came to the conclusion that hay cut in our mountains might suit them better. I procured a bale of the best South Park hay, and this

[49]Merriam, Ovis sheldoni, p. 132.

alone undoubtedly saved the Sheep. This hay they ate with great relish, and soon laid on flesh and became hearty and strong.

. . . . . .

"When at liberty, the ram used to feed on anything: bread, kitchen refuse, in fact, anything but old tin cans.

"At last Dr. Hyer returned from California, where he had been in the interest of the Halle Institution. We at last got the Sheep ready for shipment. I put each in a separate crate, and sent along a dozen bales of South Park hay, carrots, oats, and cress. In fact, we did not change the diet in the least.

"The Sheep left this country in the best of health and condition."[50]

One of the most experienced animal managers in America is, undoubtedly, W. H. Blackburne, of the Washington Zoo. He has been quite successful in raising Mountain Sheep by adhering to one or two principles: 1st, keep them in a "skinned" paddock; that is, one with all sod and green growth removed; for every bite they eat must be under control. Grass, clover, and weeds, the usual growth of this region, are anathema, absolutely certain to cause fatal enteritis. 2d, give them just so much as they will actually clean up, of mixed timothy hay and whole oats.

Five years' continued success with the same individuals is surely proof that the method is right, especially as a number of these were born and raised in captivity.

Drink

There seems to be no doubt that the normal Bighorn in its normal range drinks deeply of the best water it can find—once every day, preferably in the evening. On the rugged buttes of the Yellowstone in August, it was one of the daily pictures to see the wise old ewe leading her band down, down by devious, dangerous paths with many a cautious, peering, sniffing halt, to the old familiar drinking place.

In winter, they commonly eat snow, so dispense with drinking. D. F. O'Keefe says of the big ram he caught alive in Colorado: "I never knew him to drink water during his 5 months' captivity. He always ate snow instead."[51]

But on the great desert ranges of the far Southwest, where the Sheep still exist in flocks, protected by the climate, the desert sands and the scarcity of water, what do they drink?

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[50] Fifth Ann. Rep. N. Y. Z. Soc. 1901, p. 114.

[51] Recreation, Oct., 1898, p. 270.

The native hunters answer briefly: "The Mountain Sheep of the Desert never touch water at all."

Like the Antelope, the Kangaroo-rat, the Jackrabbit—yes, even the Cattle of those arid regions—they have learned perforce to do without drinking, wherever there is cactus. These vegetable tanks store up greedily every drop of water that they can seize on during the rare showers; and keep it in their big, fat-bellied leaves for their own use, protecting it with the bristling array of fearsome spikes that keep most would-be plunderers away. But the Sheep have learned to nibble off the spines with fine adroitness, until an opening is made to the fat, green water-bag, And so, their thirst is quenched.

Other plants, too, have in less measure a supply of water. Even domestic Sheep learn to use them; and nature adapts their constitution, so that these Sheep often go for months without any other drink than the juices of plants.

There is an ancient legend that a certain man believed eating to be merely a bad habit, so trained his Horse, by degrees, to do with ever less food. Just as he got it down to one straw a day, the unappreciative animal died. The moral of this tale does not apply to the Mountain Sheep; for it seems actually to have trained down so that it does without drinking, and yet lives.

The demonstrator of this amazing idea is the Dwarf Bighorn of El Rosario Mountains, which are on the desert near the head of the Gulf of California, 12 miles distant from the Gila Range "from which it is separated by a flat desert, with 6 or 7 miles of soft, sand dunes. The part of the Mountain large enough for Sheep is 5 miles long and only 1,500 to 1,700 feet in altitude, and is of the honeycomb type like the Gilas. There is not a drop of water in the whole range, and practically no cactus on or near it. The nearest water is 20 miles away in the Gilas."[52]

Here Sheldon found half a dozen of the Dwarf Sheep, and secured a ram, the type of the form *sheldoni*, the smallest Wild Sheep in the world, standing only 30 inches at the shoulder.

In further detail, he says: "During the long periods between rains—commonly 4 or 5 months, and sometimes more than 8 months—the Sheep must live without water; for there are no rocks that will hold water more than 3 or 4 days. No rain fell between August 1915, and the time of my visit in March 1916. The bladder of the ram killed, measured 2 inches, and contained only traces of a discoloured liquid."[53]

[52]Merriam, Ovis sheldoni, p. 129.

[53]As above, p. 130.

However, the waterless, arid, burnt-up desert is not Paradise for any of the big game. Although plant juices will preserve them alive in times of drought, the mountain spring is the ideal drink. There are many more of these than the passing traveller would suppose; and if there be one within 20 miles, the Sheep will find it out, and by the subtle wireless code of their kind, let all their clansmen know.

His Smell-power Is Small

It is in the line of many precedents that the eyesight of this creature of the open should be of the highest order; also, that his ears should be reduced in size compared with those of the dwellers in the thick woods, such as Moose and Deer. But the power of his scenting sense is surprisingly small, even though what might have been expected.

Ned Frost, the well-known guide of Wyoming, writing to J. A. McGuire of Denver, says in evidence of this: "While hunting near the head-waters of the Shoshone in Wyoming with Judge Ford of New York, Sept., 1915, we had been watching a couple of bunches of Sheep for some time, and one lot of seven being right in line with where we were going, we exposed ourselves to their view, and watched results. Six of them 'beat it' at once, but the other one never moved, and we found later that he was sound asleep in the sun, and he never woke up till we were just opposite him and about a couple of hundred yards away. Then as he got up and saw no Sheep close by, he evidently made up his mind we were Sheep, and here he came, right up to within five feet of us, and then seemed much surprised to find we were not his kind of people at all. But still he was not frightened enough to beat it, but kept walking around us within a few yards as though trying to make us out to be Sheep anyway. He was only a yearling—but show me the yearling Elk, Deer or any other wild animal that would exhibit such bone-headedness! It was just such doings as this that made me think that they were not much on the scent, and I have proven it to myself many times, and even that same day I took Judge Ford right up to within thirty yards of seventeen ewes and lambs with the wind blowing straight from us to them."[54]

To this, McGuire adds after much experience in stalking rams: "I am convinced that they haven't the keen scenting powers with which they are generally credited. I class the Sheep's scenting qualities about on a par with the Bear's poor vision."[55]

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[54]Gamelands, pp. 89–90.

[55]As above, pp. 99–100.

His Leaping and Climbing Powers

There is a wide difference between the mountaineering of the White Goat and that of the Bighorn. The Goat is a climber like the Monkey; the Sheep is a sure-footed bounder like the Chamois.

At once, since bounding is his great gift and the secret of his power, the question arises: How far can he bound? Not more than 6 or 7 feet straight up; not more than 15 feet on the broad jump. These limits I have proved in many ways. Those upward leaps, that look like sheer jumps of 15 or 20 feet, are easily explained, as will be seen; while the broad jumps of more than 3 or 4 times the animal's length, are always on a down slant. A perfectly level broad jump is practically unknown.

A proof that this is so, is seen in the fact that smooth walls, or walls with an overhang—although only 7 feet high—are enough to hold the strongest and wildest Bighorn.

In Amsterdam Zoo, 1900, I saw 3 Bighorns confined in a pen that had walls only 5 feet high, but with 2½ feet inhang, i. e., a total height of about 7 feet.

In Washington Zoo, they keep their 5 superb Mountain Sheep in a roomy paddock, the walls of which are only 7½ feet high, without any overhang. All of which is evidence that a height of 7½ feet is beyond the jumping power of the Bighorn, however strong and active:

How then, are we to account for the amazing feats of high jumping ascribed to the creature by good observers?

In 1886, I saw at the Smithsonian Institution in Washington, a 5-months-old Mountain lamb that had been brought from Montana, destined to be the nucleus of the National Zoo. It was confined in a wire netting corral 8 feet high, and yet again and again it was found to have leaped out. It was quite tame and easily led back; and at length, its puzzling 8-foot leaps were explained. A horizontal 2 x 4 timber, all around at 4 feet from the ground, supplied a satisfactory halfway ledge. In a corner of the pen the lamb would take a flying leap to the flat, narrow, 2-inch timber of the side; in a flash, he turned, got a new take-off at an angle, and reached the top of the fence in what was really the second bound.

In the recent attempt to trap some of the Ouray Sheep, in Colorado they escaped over a corral fence *16 feet high.* So said the magazine article. As a clear jump, this is a physical impossibility. I do not believe there is a 4-footed animal in the world that can leap 16 feet straight up. What really happened, I think, is that the Sheep, in an angle of the corral, sprang against the boards and mesh wire, as high up as they could go; that is, 6 or 7 feet;

then caromed at an angle still higher to the other wall, and maybe, a second carom before they went over and away.

His Weapons and Methods

In discussing these wonderful feats, one should begin by considering the weapons with which they are done. First, the quick, calm brain—the "strong heart," as the Indian would call it; second, the superb outfit of tireless, tense, life-tingled muscles; third, the tremendously strong and supple feet, equipped each with two great soft rubber pads that can grip on any surface, hard or soft, rough or slippery. These feet are further armed with two hard, shell-shaped claws that are backed by a pair of emergency brakes which function or not, according as their owner bends or straightens out his limbs. So we see that soft rubber heels as shock absorbers are not, primarily, a human invention; and hobnails and toe clutches were used by Bighorns for unknown ages, while man was still running barefooted.

Many fragmentary observations, put together, have enabled us to detail the method by which a Bighorn can negotiate an appalling cliff that would be certain death to man, Mule, or Dog.

First, be it remembered, cliffs that are perfectly smooth and plumb, are so rare as to be negligible. No high rock overhangs for any considerable distance; gravity forbids that. And this is law: all cliffs, in some part of their front, lean backward; and are varied with ledges, bumps, and little shelves or crannies. In short, every cliff in the West has somewhere in its front a sheep-ladder.

Provided there be 2-inch footholds not more than 5 or 6 feet apart coming up, or 20 feet apart going down, the Bighorn faces the climb without hesitation. A wide crevice with rugged walls is an easy stairway to this mountaineer. A Monkey might use it successfully; I doubt if a Cougar could; for he has not the right kind of a mind. A man might have the mental training, but he is wholly without the necessary physical powers.

Climbing Up

How perfectly the Bighorn's weapons are adapted to their work is thus illustrated by Muir. He was exploring the South Fork of the San Joaquin River of California in 1873, when as he says, he "chanced to look across the fall, and there stood three Sheep quietly observing me. Never did the sudden appearance of a mountain or fall, or human friend more forcibly seize and rivet my attention. Anxiety to observe accurately held me perfectly still. Eagerly I marked the flowing undulations of their firm, braided muscles, their strong legs, ears, eyes, heads, their graceful rounded necks,

the colour of their hair, and the bold upsweeping curves of their noble horns. When they moved, I watched every gesture; while they, in no wise disconcerted either by my attention or by the tumultuous roar of the water, advanced deliberately alongside the rapids, between the two divisions of the cataract turning now and then to look at me. Presently they came to a steep ice-burnished acclivity, which they ascended by a succession of quick, short, stiff-legged leaps, reaching the top without a struggle.

"This was the most startling feat of mountaineering I had ever witnessed, and, considering only the mechanics of the thing, my astonishment could hardly have been greater had they displayed wings and taken to flight. 'Sure-footed' mules on such ground would have fallen and rolled like loosened boulders. Many a time, where the slopes are far lower, I have been compelled to take off my shoes and stockings, tie them to my belt and creep barefooted, with the utmost caution."[56]

But the spectacular demonstration of his power is in going up a high, rough cliff—ascending the sheep-ladder. This he does by bounding from tiny ledge—maybe but 4 inches square—to tiny ledge a little higher, 3, 4, or 5 feet beyond. Or, if it be in an angle, or a great crevasse, he leaps from side to side, knowing well that he must keep on till he gains the top, or else fall to be smashed below.

Climbing Down

It is notoriously harder to go down a cliff safely than to go up. The process is different; and in the case of the Bighorn calls for different mechanics.

When it is one clear downward leap of a score of feet, the Bighorn can do without steps. His method has been admirably described by Judge D. C. Beaman of Denver, who had enjoyed the unusual privilege of seeing a Bighorn escape from the Dogs, and leap down a precipice of 20 or 25 feet, a drop that would have mangled any other animal of the size. The Judge explains that the ram "made a sideways spring straight out from the edge of the precipice, apparently six or eight feet; and then spread his feet in a sort of bracing way, and with his body in a perfectly horizontal position, and parallel to the face of the cliff, dropped straight down to the foot of the cliff. . . . The position of this Sheep, when dropping, was stiff-legged; but the instant his feet touched the ground, his joints gave way, with increasing resistance, however; his joints acting as springs, until his belly almost touched the ground, before the force of the impact was overcome by the muscular resistance."[57]

[56]Mts. Calif., pp. 312–13.

[57]Outdoor Life, XX, 1907, p. 253.

When, however, the drop is much greater, so that no creature could take it in one jump and live, his method is quite different. John Muir has given us a fine account of it. In this case the cliff was—not 25 feet—but over 150 feet high, and only 8 or 10 degrees off perpendicular. The incident was seen by two woodchoppers who had a fair view of the flock, and could watch their progress from top to bottom of the precipice. To escape from the hunters, the whole band took the plunge, "jumping down in perfect order, one behind another. . . . Both ewes and rams made the frightful descent without evincing any extraordinary concern, hugging the rock closely, and controlling the velocity of their half falling, half leaping movements by striking at short intervals, and holding back with their cushioned, rubber feet upon small ledges and roughened inclines; until near the bottom, when they 'sailed off' into the free air and alighted on their feet, but with their bodies so nearly in a vertical position that they appeared to be diving."[58]

In my story of "Krag," I describe how the great ram descended the deep precipice by bounding from side to side of the canyon, oftentimes landing on a jutting point no larger than his own snout, pausing balanced but an instant, to select the next; and so on, till he safely reached the ground with absolute success. The incident, of course, was fiction, but it was founded on a multitude of accurate observations; so that, in its underlying statement, it was fact.

Thus, I have explained the cliff-mastery of the Bighorn as far as possible. But I have by no means explained it away. The explanation only makes it more marvellous, because true.

Accidents

Now arises the question—do these wonderful mountaineers *never* fail? Are their muscles tireless, their judgment unerring, and their nerves rattle-proof?

Here is testimony: In 1901, H. Clarke Fisk, of Helena, Mont., told me that, some years before, he was watching a female Mountain Sheep with her lamb, that were coming down a high steep cliff to a salt-lick. In his own words:

"They were almost down when the ewe missed her footing, and fell. She rolled over, and then slid and dropped at least 40 feet, before, with a frantic effort, she checked herself. She was then quite near, and, with the

[58]Mts. Calif., pp. 319–20.

glass, I could see her tremble, either with fear or exertion. She stood for a long time, and then timidly worked her way down to the comparatively level stretch at the lick, where the lamb had preceded her.

"When they were finally starting away, for we did not molest them, the lamb tried for a long time to induce the mother to go back on the route they had come," so set off alone. But the old one was either hurt by the fall, or else lost her nerve for the moment. After gazing up the cliff several times, she finally limped off around an easy trail to the summit where she rejoined her lamb.

This was the only occasion when Fisk himself ever saw a Sheep fall. But a man in Helena assured him that he knows a place where there is a gorge across a well-known Sheep trail. It is a very difficult place to leap; and down below, he found the skeletons of seven Sheep that had tried, and failed.

In Arizona University Museum at Tucson, is a Bighorn that evidently had been killed by a fall from a cliff. It was found on Baboquivari Mt., Oct. 31, 1919.

Enos A. Mills writes: "A few times I have known one or more to be carried down to death by a snowslide."[59]

Speed Afoot and Afloat

If Bighorn had the power to make the tremendous leaps attributed to them by some observers, they would rank among the swiftest of quadrupeds. Yet all who have met them in the open, testify that they are easily overtaken by a good Horse. Baillie-Grohman tells of such a case. The rider (himself) was 400 yards behind at the start; the Sheep were 900 yards from the cliffs. Yet he overtook them 40 yards before they reached the cliff, and killed the ram with his revolver.

Had they reached the cliff, they would of course have been safe; for it has been proven by many a hunter, that no Dog, and therefore no Wolf, can catch them in a race over the rocks. Perhaps a Cougar could, but even he would not follow far, for his kind do not hold to the chasing habit.

One does not think of the Bighorn as an aquatic animal, and wonders when he gets the chance to practise. Yet Audubon assures us that in travelling from one range to another, the Mountain Sheep does not hesitate to swim such rivers as may cross his path, and swims well.[60]

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[59] Watched by Wild Animals, 1922, p. 80.

[60] Q. N. A., II, p. 166.

Life on the Uplands

June is bright and often cold on the highlands of the Yellowstone; but it is mild and balmy to the wild things in whom the memory of March is yet strong. High on some broad, level bench they are strung along—the Bighorn ewes, the lambs of last year, and one or two rams too young to be accounted full-grown, dangerous personages,—only in the big-boy stage.

The warm sun in this sheltered nook, the lush, sweet grass, the protection of the cliffs, the absence of insects, make life very pleasant on this high upland. The Sheep laze in the sun, they sprawl, and rub their chins on near-by rocks, they nibble their own legs and flanks, or chew their cud.

The Mothering

The "bell-wether" is a portly ewe, the grandmother of most of them, but a "young woman" still. She is less at ease than the rest of the flock. She rises, looks about, changes her couch, stands head down and pensive. She makes a move to go away, and is at once followed by some of her flock. Then she comes back; she does not want them; she wishes to be alone. Maybe more than once she moves off before she can get away unnoticed. When behind the rocks and out of sight, she goes more quickly. A few hundred yards removed, in some quiet hollow she stops, screened by bushes and rocks, from foes and weather; and stands, legs widespread, head down, and listless. Those who know the way of the wilds could tell that she was suffering. For half an hour she waits; then, yielding to the pressure of the Allmother's hand and the unspoken whisper, she lies down on the soft grass. In half an hour more, are born the little ones—two lambs, long-legged, slabsided little things, but bright-eyed, and coloured like the mother.

So far as is known, the gestation is of the same length as in the common Sheep, that is, 150 days. In the Washington Zoo, young have been born on May 20th, May 21st, May 24th, May 27th, June 26th, July 2d. In a wild state, nearly all come in June.

Now comes the important ceremony called "owning the lamb." As is well known in our barnyards, the lamb that the mother does not own is doomed. In the mountains, the ceremony is equally vital. The owning consists in licking it from head to foot and cleaning it; and incidentally, the mother supplying herself with a purge. The lamb's coat is fluffed and dried, so he is warm and safe, his circulation is promoted; he and his mother get well acquainted for a start. Observations made on a twin of the Mountain Goat showed that the owning of the second one came late, so late that the blow-flies did their deadly work on the tender mucous parts before the

mother care had functioned; and by next sunrise hour, the little stranger was dead—dead for lack of the "owning."

The second of the twin lambs is soon cleaned and dried like the first; the owning is complete. Now her maternal instincts are fully aroused; the fond mother absolutely committed to her task.

Then as she cuddles over them, and rubs her hankering body over their trembling forms, their feeding instinct is aroused, they butt at her twin-peaked udder. Bending, lending herself to them, she cowers low; a few more blind responses to the blind instinct, and the twins are drinking their first drink; the mother's heart is flushed with the joy that is beyond words or understanding.

Maybe she fondles and feeds them for an hour; then, full of food, the lambs lie down under some slight shelter. Sounds from the distance remind the mother that she has social duties and other children.

Glancing apprehensively about, to make sure she is not betraying the crib of her darlings, she saunters quietly but crookedly back to the flock; and life goes on as before. Late that day, she goes again to feed the little ones, and continues to visit them for two or three days.

I find great divergence of opinion as to the length of their hiding time. Some say that the lamb is hidden for 3 or 4 days, and visited by the mother about twice a day. Some say that she never leaves it, and that the lambs can follow the mother slowly within an hour, are vigorous in 24 hours, and when a week old can easily keep by her side at her best pace.

A summary of the evidence and especially that given later in Loring's "Lamb Hunt" (White Sheep Life) seems to prove that usually the lamb can skip about and run quite fast when an hour or two old; but does not follow the mother at all until it is 2 or 3 days old; and does not stick to her closely night and day, until about a fortnight old. At which time, they are ushered into society to become recognized members of the flock.

One by one, the other grown-up ewes slip away during this first part of June—or indeed, any time from the last week of May to the first part of July—and one by one they come back, having borne, most of them, a single lambkin, but some of them twins.

Three groups in the main flock there are, that do not make this silent pilgrimage to the mother shrine—the ewes of last year, now barely twelve months old; the barren ewes and the rams of one, two, and three years, (the prime rams are elsewhere). Always a few of the ewes are barren, either because they found no compatible mate last December, or because they were in ill health, or, maybe, from choice. The barren ewe is known

by her sleek coat, her prime condition, her care-free demeanour. Nevertheless, this barren ewe, the old maid, may not be barren next year. She may find her soul mate; she may change her mind.

The Lambs

Late June sees all the lambkins born and skipping. They are revelling in full supplies of mother's milk, and are also beginning to nibble the soft, sweet grasses of their happy upland.

Many enemies they have at this time—Coyotes, Cougars, eagles, etc. But the cliffs are a sure refuge from the Coyotes, and partly a safeguard against Cougars. Eagles are easily baffled if a few bushes be near; for, once the lamb is in them, the eagle gives up the chase.

There is a special circumstance that helps to save the lambs during their period of weakness. That is the fact that all kinds of game are then abundant. The beast of prey that in winter would follow a week to get a chance at a feeble lamb, would not waste half an hour on it in June, because it is quite easy at that time to fill his belly with other foods strewn lavishly over the whole country.

They have another protection, too, in mother. Sheep though she be, she has sharp horns and a valiant heart when her little one is menaced.

Doctor Mearns tells of a mother Sheep that, in defence of her lamb, faced and fought some cowboys. They had to bombard her with rocks before they could rob her of her baby. They meant to raise it, and it did drink cow's milk greedily; but it was only a few days old when caught, and soon died.[61]

Perhaps the most perilous of the little journeys imposed on the Bighorn is their regular trip for the daily drink; mostly taken in evening, but sometimes at night by the light of the moon.

It seems probable that even when the little one is a month old, it does not follow to a far or dangerous watering place, but holds back, in some safe retreat till mother's return. No one, apparently, has ever seen the old one at a water-hole accompanied by her lamb in the wabbly-legged stage.

Nevertheless, a time comes when, having learned to eat and drink, the lambs do follow mother to the spring. How she dreads the risk of it for her charges! But go she must; and those who have seen her, give a picture of her consummate watchfulness, alertness, and apprehension. She descends a few yards, sniffing, gazing, listening for signs of foe; then advances farther, followed closely by her lambs, till the spring is reached. Their thirst

[61] Mamm. Mex. Bd., 1907, p. 239.

quenched, quickly they return to the nearest friendly rock to graze, to play, and at last to lie down for the night.

A still more hazardous trip that she must face with them, though less often, is in the search for salt.

Once a month all summer, it seems necessary for the grown-ups to seek the health resorts known as "salt-licks." When the Sheep dwelt on the lower levels where alkali was everywhere to be found, they seem not to have been in need of seeking the licks. But now that they have changed their range to higher, sweeter hills, the salt-lick has become a necessity all summer long, at intervals of two or three weeks.

They nurse till two months old, and are then able to live on solid food.

The summer and the autumn go by, without the lambs necessarily seeing their fathers.

Their Cave Life

Now the early snows begin to drive the game down lower, by hiding their food and hampering their movements.

The weather gets colder, and the Sheep begin to adopt a kind of cave life.

The Sheep and the White Goat are the only horned ruminants herein treated, that habitually use caves for shelter. Elk, Antelope, and Buffalo might seek the lee side of a cliff during a blizzard; but the Sheep have well-known selected caves in the rocks, into which they crowd in bad weather. They do not go in very far; that is, not far enough to be in gloom; but only far enough to have shelter from the wind and snow.

Alexander Henry, the rugged old fur-trader who explored the far Northwest over 120 years ago, was one of the earliest travellers to tell of the Bighorn. The first notice of it in his gossipy Journal is on Feb. 4, 1811. He was then on Jacques Creek at the headwaters of the Saskatchewan, and says: "In the face of this mountain, several hundred feet above the river, appears the mouth of a large cave, nearly of an oval form. I observed the tracks of several animals, which seemed to reach the cave down a winding passage among the rocks, but no track appeared to descend below it. These are the Gray Sheep which have been seen about this place; and which delight to dwell among precipices and caverns, where they feed on a peculiar sort of clay."[62] The last remark refers, of course, to the salt-licks.

Henry Bannon describes the experience of his hunting partner during their Cassiar trip as follows: "While going around the face of a mountain

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[62] Journal, II, p. 680.

PLATE LXXXI.—THE BIG RAMS OF MT. EVERTS

Photograph by E. T. Seton, Jan., 1914

on which there were many caves, he came unexpectedly upon a ram at the entrance to one of these caves; and as this lookout sped away, six others rushed out of the cave. Upon examination he found that they had been lying down in the cave about fifteen or twenty feet from the entrance."[63]

Sheep-beds

In milder weather when cave shelter is unnecessary, the Sheep make beds; not in the sense that Squirrels and Chipmunks do, yet they are well known to prepare a resting place by hollowing the ground and scraping away any loose stones that might make the sleeper uncomfortable. This is exactly what Hares do, but neither Hares nor Sheep, so far as I know, do anything in the way of lining their forms with warm or soft material.

L. L. Dyche makes the following observation in point:

"About ten o'clock, a spot was reached where the numerous signs showed that a large band of Sheep had been feeding recently. On the south side of the mountain, the wind and rain of summers and the frosts of winter for centuries, had been breaking off masses of rock, which had accumulated in a sheltered nook. The Sheep had pawed out this soft, crumbling rock, and made beds, which were lined with gravel and smooth stones, and were dry; showing that they had been occupied very recently. There were over 70 of these beds."[64]

Sociability and Voice

Of all our big, hoofed game, the Sheep alone are never solitary. Spring, summer, autumn, and winter they go normally in flocks. When one sees a Sheep all alone, one may rest assured that it is sick or wounded.

Usually the ewe bands number from 20 to 40. The first Sheep that Audubon met were at the mouth of the Yellowstone, June 12, 1843, when he saw a flock of 22, composed of ewes and young rams.[65] 40 or 50 may be considered a large band. Yet Elliot saw 150 together in British Columbia as late as 1886; and A. A. Anderson tells me that in the Bighorn Basin, he saw as many as 200 in one ewe band during the '80's.

The great flocks of ewes and lambs move down to lower levels; but so do the smaller bands of the great "curling-horned" rams. They appear now, but they do not join the ewe bands. nor do they enter into the flock life.

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[63]Forest & Stream, April, 1918, p. 206.

[64]Camp Fires of a Naturalist, by Clarence E. Edwords, 1893, pp. 155–56.

[65]Q. N. A., II, p. 165.

These ram bands or "buck bands," are rarely more than 5 or 6 in number. The highest I ever heard of among the prime "curling horns" was 15.

The rule of vocal gift in equal ratio with sociable instinct hardly holds with this species. The Bighorn is one of the most silent of animals. The lambs up to 6 months old, often bleat exactly as do the domestic kind; but I never heard any sound from the old Sheep except a loud snort or "snoof."

I suppose the answer is that this creature is gregarious rather than sociable.

Social Cleavage and September

There are, then, these two well-marked social groups in the Sheep world—the great flock that is the main body, consisting of ewes, lambs, and young rams, led always by the wise old ewe who is grandmother to many of them; and the second group, composed of half a dozen huge rams, 7 or 8 years old, in their full-grown prime, with great curling horns that would be a crushing load to a weaker beast.

There is a natural aloofness, an instinctive etiquette, that has hitherto kept these groups apart. But this feeling now weakens, as they see each other daily on the range. Often, in late September, they have become so tolerant of each other that they drift about together, still led, however, by the wise old ewe.

Prof. Leon L. Gardner, of Pomona College, has given us a picture of Sheep life at this stage among the mountains of southern California.

In Sept., 1914, while hunting for Deer in the mountains north of Los Angeles, he was "at last led to the outermost point on Ontario Peak, and here a rest was taken on the top of a big rock. About midafternoon the silence was broken by faint yet unmistakable sounds, which could have only been made by a whole troop of animals. There was the sound of twigs snapping, the bleating of lambs and the peculiar shuffling sound caused by the tramp of many feet. It was very evident that a band of Sheep was approaching. A cautious observation over the edge of the rock disclosed a very interesting sight. Coming along the top of the ridge was a party of Sheep, an individual stopping here and there to nibble at the vegetation. The rams, with their great curling horns, were a majestic sight, while the young of the year were exceedingly playful and altogether charming. Unfortunately, at this stage a scent warned the Sheep. In a second the whole band halted, heads up, noses questioning, then at an invisible signal they all wheeled and made off in jerky, stiff-legged, bouncing leaps, and quickly disappeared from view."[66]

[66] Cal. F. & G., Jan., 1918, p. 19.

September is the moon of good times, good food, and happiness. Then the Sheep appear the best; and rejoiceful it is to see their bodies respond. Clarke Fisk writes me:

"I think they are next to Goats in their ability to take on tallow, and I have seen some old rams who looked almost square from a side view, almost exactly resembling the stock lithographs of fine bred domestic rams, with the single exception that their horns were much more pronounced. At this time, the old rams will have from two to three inches of fat on their hindquarters and up their backs while the kidneys will be a great mass of fine, white tallow."

The Crafty Old Ram

Many experienced hunters have told us of the old ram's cleverness at hiding; especially when cornered in some place from which he could not escape except by exposure to fire. He commonly crouches like a Rabbit, and refuses to spring until absolutely certain that he is detected.

Baillie-Grohman has many pages extolling the marvellous gift for self-preservation that distinguishes the experienced old Mountain rams.

They are, he says, "very cunning animals; they will let the sportsman pass them a few paces off and not budge, and, when he has turned his back, rise and make off. Of this I very frequently convinced myself, till I finally got into the habit of filling my right pocket with pebbles, and throwing one or two wherever they could possibly be hidden under overhanging rocks or other shelter; my trouble being rewarded on several occasions by thus starting small bands of eight or ten heads, giving me capital opportunity to select the best."[67]

Describing the pursuit of two wounded rams, he says: "On both occasions, we spent a whole day vainly trying to get our victim, who carried good horns. Leading us circuits up and down endless and very steep slopes, they got away on both occasions by returning like the Hare to the spot where they put up; and from thence keeping to their old spoor, they finally left it where the ground was most broken and no snow, by one huge leap, down steep rocks, where their spoor was soon lost."[68]

Clarke Fisk, who witnessed this ruse many times, has sent me a long and detailed account of a memorable occasion. He and his friend, Joe G. Hilger, while hunting on the Upper Missouri, saw a ram on a far, high ledge. Both fired and missed. The ram scrambled around a point and out of sight. After several hours' hard trailing and climbing, he made sure that the ram

[67]Camps, p. 166.
[68]As above, p. 167.

had not gone far, but was somewhere near and in hiding. Now, his companion rejoined him, and, in Fisk's own words:

"After he had missed me he had climbed around the rocks for several hours till at last he found himself down on the point around which the ram had gone when he left the basin. Off to the left was a dark cavern which ended in a black cave. He could not see into this from where he stood nor from above, as a point of jutting rock partly hid the cavern's mouth. Down off the point, some fifteen feet, a narrow shelf cut round into the gorge. On this there was still a little snow, and Joe climbed to look for tracks. He was forced to leave his gun on top, for, in 'shinning' down a dead tree which he used for the descent, he was obliged to use both hands. There on the shelf were the ram's tracks, so he thought he would work around and look into the cave. The shelf was narrow and Joe had to cling to the rocks above with both hands to keep from falling. In this way he was busy for some time when a frightened snort stopped his progress. From where he was he could look into the cave and there, 'big as life and twice as natural,' was the ram. The old fellow was very much startled at this storming of his retreat, and stamped and snorted as he gazed wild-eyed at his pursuer.

"Joe said he wished he was safely out of that scrape, for the only exit from the cave was the narrow pass which he now almost filled. The ram could not have passed upon the shelf without one at least going off the ledge, and as it was about a hundred feet to the first landing Joe did not want to be the one to go. The actions of the ram indicated that he was going to clear the way with his mighty head.

"But the quarters were too close for the Sheep, and with a final snort he started out. Joe hung tight and clenched his teeth and waited for the end. But with a mighty bound the ram went sailing like a bird over his head, then dropped and dropped, but finally landed far below on the narrow ledge. When he struck, the ram's shoulder blades came out high above his withers, and his belly scraped the shale as the broad back sagged with the weight and speed, for the distance was almost one hundred feet. Though the ram may have known of this ledge below the cave, when he started on his leap he could not possibly have seen where he was going to land. With the impetus of this tremendous leap, the Sheep had stopped himself in a couple of stiff-legged jumps and had then made off around the cliff on his back track."

The Battering Rams

December on the Northern ranges means deep snow, hard frost, and the mating season of the Sheep—matings, as in most animals, and especially

among the highly polygamous, that are ushered in with deadly combats. Lions roar, Elk bugle, Cattle paw the earth, Deer slash the brush by way of challenge, then close and do their best to win. The Mountain ram wastes little time in idle mockery, squanders no breath in bawling.

Sometimes he scratches the gravel as a gesture of defiance, and I think that sometimes he stamps.

But even in the height of the love-and-war season, the ram seems to dispense with the unnecessary embellishment of loud talk. He looks at his enemy, shakes his head, maybe rears for a moment. The other knows exactly what that means, and gets ready. They back off a little for a good start, and from a hundred feet apart, they let loose. With a muzzle velocity of 20 miles an hour, they meet like two pile-drivers. The crack of horn against horn can be heard two miles off on a calm day; each a 300-lb. projectile hurled with that fearful force. How can skulls and neckbones stand it? Yet they do; and the mighty brutes wheel off, ramping on their hind legs, like heraldic unicorns. Each strives to show the other fellow how fresh and unwinded he is. Then they back up, and go at it again—BANG!

Sometimes, though rarely, the horn may exercise another function,—not of sledge hammer, but of sword. Baillie-Grohman records the taking of a ram "shortly after the rutting season, who had an immense cut, extending from the shoulder to the middle of his back; a wound undoubtedly inflicted by a rival."[69]

But this is rarely the finish. Weight and endurance are what count. They wheel and charge again and again, maybe half a dozen times before they prove the present problem, and show clearly, to the satisfaction of both, that 312 lbs. multiplied by 20 miles an hour and backed by 10 recuperative kilowatts is better than 340 lbs. multiplied by 20 miles an hour and backed by but 5 recuperatives. This is nature's try-out. For this they have trained; and for this, and by this, their race was made; for this they grew these mighty horns.

My old friend, Col. G. O. Shields (Coquina) was privileged to witness one of these thundering fights in the palmy days of the '80's. Thus he sets it forth in his "Big Game Book":

"Two lusty old rams became involved in a quarrel over a demure-looking ewe, whom both seemed anxious to captivate. As one of them moved toward her, the other, which was a few feet in the rear, made a vicious rush at him, and striking him on the port quarter, sent him spinning and reeling a distance of twenty feet or more. This was the signal for open

[69]Camps in Rockies, p. 420.

hostilities. The jealous rivals squared away, faced each other, and prepared for war. For a moment they stood sullenly eying each other, their manes erect and their eyes flashing fire. Then, as if at a given signal, they lowered their heads and charged each other with all the force and fury of mailed knights in the lists. Their massive horns came together with a shock that seemed sufficient to grind them to splinters, and to dislocate the necks of the angry beasts; but they simply reeled, staggered, shook their heads, and then slowly backed off, until thirty or forty feet apart, for another encounter. Both now seemed more savage and desperate than before. They snorted, groaned, and pawed the ground in their rage. By this time most of the herd had gathered about to watch the battle. They formed almost a perfect ring around the contestants, and seemed as deeply interested in the fight as are the toughs who gather to watch a human slugging-match.

"Again the burly foes went at each other with the speed of race horses, and met with the same terrific shock as before. The sound of their clashing horns could have been heard a mile. The animals were evenly matched in size, and the contest was bitterly waged. Each round consisted of a single assault, and as the belligerents became heated and blown, the waits between the acts were prolonged, each requiring time to recuperate for the next onset. Both were now bleeding profusely at nose and ears, and apparently suffering great pain. Yet the terrible blows were given and received with as great spirit and as unwavering courage as at first. Finally, after a dozen or more rounds had been fought, both rams began to stagger and totter on their feet. Still, there was no indication as to which would be the victor.

"At this stage of the game, a restless partisan of one of the contestants made a rush at the other, and striking him squarely on the shoulder, knocked him down. No sooner had he dealt the blow, than he in turn received a countercharge, from a champion of his victim, that sent him to grass. These two then squared for each other, and the fight at once became four-cornered. Shock after shock resounded over the hills, and the sound of the blows was like that made by powerful men breaking rocks with great sledge-hammers.

"Finally, the original pair drew off, neither having strength nor inclination to pursue the other; each staggering and reeling as if each step must be his last. The fresh combatants hammered away at each other until they in turn began to falter. But these were not so well paired as the others, the one that first entered the lists for his friend not being the equal of his antagonist in strength or staying qualities. At every onset he was driven back, and more than once was forced to his knees by the superior

weight and strength of his adversary. At last he was thrown backward with such force that he fell prostrate on his side. His antagonist followed up the advantage thus gained, and when the unfortunate creature attempted to rise, struck him a fearful blow that laid him out, to all appearances stone-dead. The victor then walked away with his head up, and thus the battle was ended. The vanquished ram soon recovered, partially, and slowly regaining his feet, staggered away and left the herd."[70]

Now here is an interesting sidelight offered by Sheldon. His observations convince him that two rams that have chummed together all summer, in true ram fashion, will not fight each other in the fall. Even under the mating craze, their old friendship stands the strain. They divide whatever mates there are to divide. All their warlike fury is reserved for, and turned against, some stranger ram that attempts in modern parlance to "butt in."

Their Gallantry

In these great battles-royal, broad chips and splinters fly from the horns of the battering rams. One wonders indeed that any part is left intact. And when the great Ananias-Munchausen sought to explain those breaks by stating that the huge ram lands safely on his horns when he leaps from a mountain-top to its base, the matchless nature-fakir forgot the law of gallantry. See how unfair he was to the lady Sheep who have no such headgear to act as shock-absorbers.

But no one can accuse the "Bélier de Montagne" of being ungallant at this season. He fights to win; and having won, the victor takes the spoils. All of them. Nor are they coy about being taken. For every ounce of strength and unit of desire that is in their strong and amorous make-up is now consecrated to conforming with the scriptural admonition to be fruitful and replenish the earth. The Long-night Moon, December, is the time of the fecund passion. A score of wives this grand old Turk may have had; and a score or more young Bighorns of his ten-times sifted and selected breed, may be born in June, to carry in them the best endowments of the race, so far as he embodied them.

By January, the Snow Moon, the craze is over in the North; and the mighty and much-married ram goes calmly back to the club; that is, to his coterie of bachelor friends. He wonders, doubtless, as he passes by the ewes, whatever he could have found attractive about those dull creatures not so long ago.

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[70]Big Game of North America, 1890, pp. 382–83.

Never Surrender

An interesting picture of the Ram's combativeness at other times than the rut, is furnished by D. F. O'Keefe of Leadville, Colo. He was snowshoeing to view some mining claims in the mountains, just after a heavy snowstorm in Feb., 1897. He noticed a dark spot in an enormous snowdrift, some distance ahead. Watching intently, he says, "I made out a Mountain Sheep, helplessly floundering in the deep snow. As I drew near, I could see he was completely worn out by his struggles. He looked up with such piteous, appealing expression, that I had not the heart to leave him there. But when I went closer, he showed fight, and would have none of me. At last I got him by the horns, dragged him to a sheltered spot, and there left him for a while. Then I went back to get my Horse, but he had gone home, so I walked 8 miles to a cabin, got a man and 2 Horses, returned as far as we could on horseback, and snowshoed to where I left the Sheep. By dint of 4 hours' dragging and pulling, we got the old fellow to the Horses. Then it was an easy matter to pack him to the cabin.

"I stayed in the cabin that night, and next morning went on to my claims. On my return, 3 days later, I stopped at the cabin to see the Sheep. He looked very different from the poor wreck I left there. I was told that he had been eating everything in sight, from salt and oats to sugar, and had grown very 'sassy.' We made a box, put him in, took him to the railroad station, and shipped him to Leadville by train."

Once there, they tied him, by a rope, to a tree, thinking he would be a fine pet. But he would make no peace, nor permit anyone near him. As the rope soon showed signs of wear, O'Keefe feared the ram would escape, so decided to move him to the barn. Although the animal weighed only 150 pounds, it took 4 strong men to handle him. However, all closed in at once, and managed to hold him to the ground. In one corner of the barn was a high bank of snow and ice. On this he would stand in fighting defiance of all. He never surrendered, so finally he was sold, and shipped to Hamburg, Germany.[71]

The Timidity of the Ewes

In sharp contrast with the fortitude of the rams, is the fearsome shyness of the ewes. They have been known actually to die of fright. The following case in point is supplied by Clarke Fisk. He and his hunting pal had scattered a band of Sheep. He says:

[71] Recreation, Oct., 1898, p. 270.

PLATE LXXXII.—WINTER ON YELLOWSTONE CANYON

Photograph by E. T. Seton

"One of the Sheep ran into a narrow canyon. They knew that she could not get out, so while one held the entrance the other went back to the Horses after ropes. As they approached, the ewe stood trembling in the farthest recess of the rocky trap. One of the men at the first cast caught her around the neck. She made no effort to escape nor offered any resistance, only as they drew closer she shrank still farther back against the rock. As one was about to lay his hand on her she fell over and in a few minutes was dead. Inasmuch as she had not struggled, the theory that a bloodvessel had been ruptured could not be advanced. The only supposition they could vouchsafe was that she had simply died of fright."[72]

Winter Life

If you have the luck to be in Yellowstone Park during January, you will see a wonderful reproduction of primitive wild life among the Sheep. Half a dozen of the great "Curl-horns" are always on the uplands just below the crags of Mt. Everts; and down among the sheltering flats and canyons of the Gardiner River can be seen a flock of 40 or 50 ewes, lambs, and ramlings. The big fellows are shy and avoid being photographed. But the flock by the river scarcely turn their heads to look at you.

This was the ancient social placement. The great difference to-day is that continual pursuit has made this once unwary creature the wildest of the wild. The old rams with 7 or 8 years' rings on their 18-inch calibre horns are the shyest, wariest game in the West.

This, indeed, one may accept as a rule: That in a flock of Bighorn, there is always one on the look-out, one keen-eyed sentinel perpetually on duty. And of this be sure—he can see you twice as quickly, and three times as far, as you can see him. Finally, he can travel 10 miles while you travel one—and rarely fails to do so.

Curiosity and Strange Instances

There is just one weakness in the mental panoply of the Bighorn; that is his curiosity. It is not the overpowering, alluring kind, that possessed the Antelope, and permitted thousands to be decoyed to their doom; and yet it is just enough to prevent his making good his escape when startled by some near and suspicious sound. His first impulse,—and he commonly acts on it,—is to bound away a few yards, and up on to some lookout, where he stands at gaze until he makes out the nature of the menace; or often, alas, until the crack of the rifle says "too late."

[72]Mss.

George F. Dippie, taxidermist of Calgary, told me in 1914 that he got a very large ram's head that had a rock tight wedged in between its horn and its cheek—doubtless a souvenir of some landslide. This head was sold to Doctor Palmer of Davenport, Iowa.

A. Phimister Proctor, the animal sculptor, has a notable ram head, one in the record class. He killed it on Yarra Creek, north of Waterton Lake, Alberta, Sept. 14, 1910. It has 2 or 3 Porcupine quills between the horns. What a suggestive embellishment! One can imagine the meeting of those two redoubtables, probably on some narrow ledge, above a canyon, and their mutual disgust at the outcome; especially if the ram knocked the Quiller off the ledge, and got his head swelled with quills for his pains.

A curious case of innocent curiosity is thus recorded by J. A. McGuire of Denver. It was told him by Ned Frost, the well-known Wyoming guide.

"I once had a good-sized ram come up to me where I was eating my lunch," he says, "and after working around, and sizing me up from all sides, he finally came right up to me and actually licked my hand, and I could see myself in his eye, just like looking in a small mirror; but when I made a grab at his front legs, thinking that perhaps I might be able to throw him and get him in alive, he got really frightened and showed that he was a real sure-enough wild Sheep, by getting down off that mountain and up the other side of the canyon and over the highest peak in sight without hardly stopping to look back. I would not have liked to tackle the job of getting within rifle range of him again that day."[73]

Antler-bound bucks have been found in every species of North American Deer, but I was not prepared to hear of horn-bound rams. W. H. Blackburne, of the Washington Zoo, tells me that the two big rams in the Bighorn herd there, got their huge horns interlocked somehow by accident as they fed, and spent half a day wandering about tightly hooked head to head, arm in arm, until at length, by some lucky twist, they solved the problem and parted. These two never were known to fight.

Many animals make odd partnerships, the basis of which seems to be partly common interest, and partly good fellowship. W. A. Wadsworth says: "I have seen a yearling Bighorn ram walking solemnly along a mountain trail after a big bull Elk."[74]

Similar cases are given in the White Sheep Life.

One of their strangest habits, says Baillie-Grohman, "is the friendly relationship existing between them and the mountain magpie—about the

[73]Gamelands, p. 89.

[74]N. Y. S., F. F. G. Rep. for 1901, pub. 1902, p. 242.

only bird you see or hear on the timberless barren mountains, which are the favourite home of the Bighorn. Small flocks of ten or fifteen birds will settle down on the backs of the grazing Bighorns, and begin to pick away very busily at the minute larvae that infest the scrubby coat; two birds often being engaged on the same animal."[75]

Playfulness

It is recognized nowadays that animals get practically all their training for the life battle, in the form of play, more or less, organized as games. Witness the training of kittens over imaginary Mice, and of puppies over things they pretend are Deer.

The only reason that men have ignored the games of wild animals was that they were too busy killing them to observe them. But good hunter-naturalists are growing up, and opportunity is coming back in a small degree at least.

Wm. R. McFadden, of Denver, and other observers, describe young Bighorns playing "King of the Castle" like the lambkins of our common Sheep. Once at Crater Lake, British Columbia, he had the good luck to see a flock of 57 ewes and lambs. There were 23 of the latter; they were playing like domestic lambs, butting each other in mock fight, merrily gambolling and jumping on a little hillock that evidently was the castle.

Doctor Merriam tells me that he has watched them leaping on their mother's back as they played the game, and she stood stock still as may be —happy indeed to be the dummy in their game.

Enemies

Ordinarily man, the deadliest enemy of the Bighorn, can do him little harm on the desert ranges where rugged mountain, arid plain, and the fear of thirst unite to protect the wild things. But another factor enters the problem. Springs are located by the diligent search of man as well as beast. Near one of these the destroyer, with his deadly weapons, can lie in wait with every prospect of success.

Nelson says, "Mountain Sheep are peculiarly endangered by this slaughter owing to their habit of going in bands and drinking at certain watering places, where hunters lie in wait behind blinds built of loose stones, and kill individuals of all ages and both sexes, often in a few minutes destroying an entire band. I have been informed of one party having killed more than 100 Sheep in this manner to make dried meat during a single season."[76]

[75]Camps, p. 163.

[76]Lower Calif., 1921, p. 132.

Among the wild things, the worst enemy the Bighorn has is the Cougar or Mountain Lion. He is known to take his toll of the herds especially in winter.

In Yellowstone Park, in Jan., 1914, I saw and photographed a 2-year-old ram that was crippled as a result of meeting a Cougar. This was the only solitary Sheep I met. But Cougars are not plentiful, and they love not the open, rocky hillsides to which the Sheep resort.

A. A. Anderson, of New York, tells me that he once wounded a Sheep, but followed and got him; then took part of the meat to camp. When he came the next morning for the rest, he found that a Mountain Lion had followed the trail, and eaten it all.

Wolves undoubtedly rank high among Sheep killers.

Dr. George W. Field of the Biological Survey, gives me some evidence. In the March of 1917 he was going along the Gardiner side of Mt. Everts in Yellowstone Park, when he saw two big rams lying down together on the mountain-side above him. Suddenly, they arose, and intently watched something to the eastward. Then Doctor Field saw a big Timber-wolf stalking the rams. It advanced not directly, but in a succession of zigzags. The rams, however, were alert and bounded away before the danger became serious. Under some circumstances, this approach would have meant success for the Wolf.

In Alaska, both Lynx and Wolf are charged with much destruction among the Bighorn. These are treated in the Life of the White Sheep.

What may, perhaps, be listed as an enemy, is the vegetable Porcupine, thus mentioned by Bailey in describing the Sheep he collected in Texas:

"The legs of the Sheep secured were filled, especially below the knee, with cactus and agave thorns that had gone through the skin, and broken off in spikes half an inch to an inch long, and lodged against the bone or the inner surface of the skin. A large share of these thorns were the terminal spikes from the leaf blades of *Agave lecheguilla*, which grows in great abundance over the hot slopes of the mountains, and which the Horses avoid with even greater care than they do the numerous species of cactus."[77]

Diseases and Age

There seems to be only one dread disease among the Bighorns; that is, a species of scab or mange.

Edwin Carter, of Breckenridge, Colo., told me in 1899 that the Sheep in Colorado were very subject to a skin disease like mange. Some were so

[77]Texas, pp. 73–74.

badly affected that the ears were plugged up swith a mass of solid matter so hard that it could be removed only with a strong, sharp-pointed tool of metal. When he came to Colorado in 1859, he found it as prevalent as now.

Warren records that "C. F. Frey tells me they suffer much from scab in the West Elk Mountains," and that a party told him in 1902, at one place near the head of Sapinero Creek, 75 head were counted which had died of scab. Domestic Sheep have been run in that locality, and the Wild Sheep doubtless contracted it from them."[78]

Dr. William S. Devoe of Pine Ridge, S. D., tells me that he examined these Sheep, and found the disease to be true *scabies*. The sheepmen say that the Bighorn gave it to the common Sheep; the cattlemen claim it was the other way.

A. A. Anderson considers that scab became virulent only when the Bighorn were driven off their ancient alkaline feeding grounds up into the different surroundings of the high pastures. Alkali, he considers essential to their health, and up in the mountains where they cannot get it, the unnatural food gives them liver disease; they get thin, go scabby, get blind, and die

Whatever the cause, the disease is well known, and sweeps through the ranks of the Sheep like fire through prairie grass.

Abe Leeds tells me that when he and Pierce Cunningham trapped in the Bighorn country in 1886, the Sheep were more plentiful than any other game. They were then in thousands, and commonly the hunters saw 500 Sheep in one day. But between 1886 and 1890, the scab was brought in by tame Sheep, and the Bighorn died like flies.

In *Recreation* for July, 1898, p. 57, is an article by Vic Smith, of Anaconda, Mont., stating that in 1885 there were large bands of Sheep in the Wind River Mountains; but next year, domestic Sheep brought in the scab, and cleared them out. In 1886 "near where Red Lodge now stands I counted . . . 43 dead Mountain Sheep on one hillside, all having died with scab."

In most of the Sheep country, the plague burned itself out; but since then, there has been more than one local outbreak. In 1914, it appeared among the Sheep of the Lemhi Natural Forest; and more than once, it has been reported in the Yellowstone National Park.

A curious possibility is found in this quotation from Baillie-Grohman:

"Professional cimarron-hunters generally carry a meat-bag, as contact with the hairy coat of the Deer-sheep often afflicts the human skin with

[78]Mamm. Colo., 1906, p. 238.

cosquillas ('sheep-tickle') a persistent itch, that sometimes spreads from the hands to the chest, but strange to say, cannot be traced to any visible cause. Like mange and prurigo, it is probably caused by microscopic parasites."[79]

I have enquired many times and in vain, among hunters for further information on the "Sheep tickle." No one else that I can find has mentioned it.

The ram is usually prime at the age of 5; and continues so for at least 4 or 5 years. In the Washington Zoo, 1926, there died the old ram who had dominated that small band for 8 or 10 years. He was 20 years of age, and evidently very old.

Snow

One cannot close the list of natural foes without large mention being given to snow. Cold weather is a small matter to the Sheep, if they can get food; and food there is in abundance on their range, so long as it is not hidden under deep snow. A little snow is amusing; for the grass and mountain clover are green beneath it. The Bighorn paw like Horses on the range, and win an ample feeding.

If a heavy storm come on, they huddle under some sheltering cliff where, crowded side by side, they keep each other warm; and work their way out after the storm is over. Or maybe they have a well-known cave into which they crowd and take life easy, out of the blizzard's reach. Then, in the calmer time, forth they go to set merrily about digging up another meal —only going a little deeper than a few days ago.

Still they thrive, but when the snow gets so deep, and so ice-encrusted that they cannot reach the daily ration, the old ewe faces the stress, takes the one way out—leads the flock forth, and down, down to lower pastures where maybe there is less snow. Oftentimes it is so; for there may be two months' snow on the upland and only one in the valley. But far now from the safety haven of the cliffs, they are exposed to greater dangers from enemies that would feed upon their flesh.

Sometimes they linger so long in the uplands that the fathom-deep snow itself prevents their travelling out.

"How the Wild Things Die" is the title of an article by W. B. S., in which he sheds light on the hardships of deep winter in the High Rockies. It was on the Continental Divide near Mt. Richtofen in Northern Colorado, where "the snowfall is often so heavy that the cabin itself completely dis-

[79]Camps, p. 421.

appears; and it would seem as if no living thing larger than a Squirrel or Marten could survive. But such is not the case. This section is rather noteworthy for the number of its Mountain Sheep. They brave out the winters in spite of the snow, subsisting upon the scanty herbage, found in sheltered nooks among the rocks or on ridges swept bare by the wind.

"One recent winter, when the snowfall had been reather heavy, two of the company's men, stationed at the cabin, heard a furious barking from their Dog. He had found in the snow and brought to bay near the cabin a fine old ram. The poor creature was nearly dead from lack of food. The storms had evidently covered up his range, and being old and feeble, he had been unable to follow the more vigorous members of his flock to pastures new. The old monarch was rescued from the Dog, tied up and offered hay in plenty. But his teeth were nearly gone and the diet was unaccustomed, so he could do little with it, succumbing after a few days from sheer inanition. As that region has many Mountain Lions, it is quite remarkable that death came to him from the disabilities of old age and not by violence."[80]

"In travelling in the heavy snows," says Clarke Fisk, "Sheep string out in single file, the leader setting the pace, which under existing conditions is surprisingly fast. He will jump up and forward out of the snow, and land perhaps fifteen feet ahead. On and on he jumps till he is tired and then another takes his place. And all follow directly in his track. The speed so maintained, even if the snow is well above their backs, and the distance which can be covered in a comparatively short space of time are remarkable. I have known of their travelling almost fifteen miles over two high ranges in a little more than three hours when the snow lay not quite four feet deep."[81]

The snow-slide—that terror of the mountains, that visible incarnation of the Snow Devil, doubtless claims far more Sheep lives than we dream of.

When I visited John Muir in 1899, he gave me in conversation many interesting details of Sheep habits. He says these animals usually descend from the high mountains when driven by the snow; but sometimes they get caught by a sudden heavy storm. About 1875, on the South Fork of the San Joaquin River, about 11,000 feet up, he found 5 large rams all dead together in a space as large as a room. There was nothing but the hair and bones, with a huge pile of chrysalis cases at each. Evidently they had been caught in the snow and had died together.

"Forest Ranger E. E. Chapson of Pagosa Springs [Colo.], says that a good many Sheep are killed by snow slides in the San Juan Mountains north of that point. In one instance he discovered the carcasses of 3 or 4 Sheep

[80]Forest & Stream, June 17, 1911, p. 935.

[81]Mss.

which apparently had been so closely shut in by a snow slide as to be at the mercy of a band of Coyotes. The snow crust was sufficiently strong to the light-footed Coyotes, but too weak to support the heavy-bodied Sheep, and unmistakable signs in the snow showed that the Sheep had been killed and partly eaten."[82]

A snow disaster immensely greater is outlined in information recently received from my friend, G. J. Guthrie Nicholson, of Newport, R. I. He tells me that in 1916, not far from his ranch at Four-Bears, Wyo., he found a deep, westward-facing gulch, above Horse Creek, Wind River Mountains, in which were the skeletons of hundreds of Mountain Sheep—males, females, and young—all evidently overwhelmed together, perhaps 35 years ago. Probably they were the victims of disease and snow. Yet they did not date back to the great plague of the '80's that swept the Bighorn herds from the hills.

Stories of the Chase

There are four, at least, that I find pleasure in reading, and counsel the reader who is interested to get them. They are too long for inclusion here, but those who wish may find them. They are:

"Description of the My-attick or Mountain Ram," by Duncan McGillivray, who, in the fall of 1800, met a band of Sheep on the site of Banff, Alta., and secured a ram which was the first specimen known to the world of science. (See section on History.)

"The Hunting of the Record Ram," in 1880, by Howard Eaton, which tells how Howard, then a boy in the twenties, secured a world's record in his first shot at a Bighorn.[83]

"An Experience in Ram Land," by L. Bush Livermore, which I like because it gives the dizzy horror of the mountain-sides; also the calm, certain mountaineering of the ram—and without a red spot on the page.[84]

Finally, "How the Big Ram Was Killed," by F. W. S. This appeared in *Recreation* for July, 1897 (pp. 10, 11, 12). It is Scotty McDougall's own account of how he killed the great Gunder Ram after a winter-long hunt. This Ram was the prototype of Krag in my story, "The Kootenai Ram."

From a great mass of bloody hunting stories—I don't know what possessed me to save them—I have selected these. They have fewer gloats, less blood, and more worth than the rest.

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[82] M. Cary, N. A. F., 33, 1911, p. 64.
[83] In the Open, Pittsburgh, Pa., Vol. III, No. 1, Aug., 1912, pp. 5, 6, 7.
[84] Outdoor Life, March, 1922, pp. 182–3.

Their value may be that of ancient record or of definite information. In some, there is even a redeeming golden thread of human heroism; but each and all of them is more or less an unwitting attest to the nobility of the hunted wild thing, that never surrenders, never gives up; and after he has done his glorious best and failed, dies in his homeland—silent, steadfast, without wail or moan, or the hint of a craven thought.

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WHITE KIDS

White Sheep, Alaskan Sheep, Dall's Sheep, Thin-Horned Sheep, Slender-Horned Sheep, Slim-Horned Sheep, Wide-Horned Sheep, Snow Sheep, Arctic Sheep, Saddle-Back, with Its Southern Races, Black Sheep, Liard Sheep, etc.

Ovis dalli (Nelson)

(L. *Ovis*, a Sheep; *dalli*, in honour of the Alaskan explorer, Wm. Dall)

Ovis montana dalli Nelson, 1884, Proc. U. S. Nat. Mus., June 3, p. 13.
Ovis dalli Allen, 1897, Bull. Amer. Nat. Hist., Vol. 9, Apr. 8, p. 112.

Type Locality—Mountains west of Fort Reliance, Alaska.

A true Sheep in its form and habits, the White Sheep is easily distinguished afar by its pure white colour, and its long, slender horns. This is a silver ram with golden horns and jewel eyes. It is much smaller than the Rocky Mountain Bighorn, as will be seen by the following measurements from Dr. J. A. Allen's paper.[1]

Size. Adult ♂: Total length, 4 ft. 10½ in. (1,484 mm.); hind foot, 16½ in. (419 mm.); tail, 4 in. (102 mm.).

Adult ♀: Total length, 54 in. (1,369 mm.); hind foot, 15 in. (381 mm.); tail, 3½ in. (89 mm.).

Weight. Rams, about 200 lbs.; ewes, about 150 lbs.

Colour. Everywhere of a dingy white, slightly shaded in summer with dull, rusty tipping to the hair, especially about the back. The horns are of a warm, yellowish horn or amber colour, and the hoofs dark horn colour. The eyes are a dull gold colour.

The lambs at birth are snowy white, while those of *canadensis* are brownish gray. This is significant. It points to complete differentiation between the two species.

Races

The following races have been recognized:

dalli Nelson, the typical form. It is pure white. T. l., Near Fort Reliance, Alaska.

[1]Bull. Am. Mus. Nat. Hist., March 4, 1899, p. 3.

kenaiensis Allen, much like *dalli*, with unimportant skull peculiarities. T. l., Kenai Peninsula, Alaska.

stonei Allen, in general form and size like *dalli*, but nearly black on the body; that is, it shows the same pattern exactly as *canadensis*, but has the white areas extended, and the gray-brown replaced by a blackish brown. T. l., Headwaters of Stikine River, B. C.

fannini Hornaday, intermediate between *dalli* and *stonei*, as it is white with a gray blanket on its body, gray facings to the legs, and dark gray tail. T. l., Dawson City, Yukon, Can.

cowani Rothschild, like *stonei*, but has the body black, with white rump and gray face. T. l., Near Mt. Logan, B. C.

nigra Millais, very dark brown, or nearly smoky black all over with small rump disk; the darkest of all local races. Only one or two specimens of this race have been collected. T. l., Mountains at the head of the Skeena River.

samilkameenensis Millais, "the smallest of all American local races, and now extinct. Dark brown all over, with small white rump patch, and horns small. These Sheep were evidently a dwarf race, closely allied to *nigra;* and in appearance and size, bore little affinity to the Sheep of East Kootenay and Lilloet, which are of the typical race."[2] T. l., Samilkameen Mountains of B. C.

Concerning the complete intergradation between *dalli* and *stonei* there can no longer be any doubt. Dr. W. H. Osgood says:

"It appears, therefore, that the evidence of the intergradation between the pure white sheep of the Kenai Peninsula and the blackish-brown Sheep of the Stikine River region is practically complete. The change from one to the other is almost perfectly graduated; and corresponds closely to the change in geographical distribution. At the extremes, there is great constancy of characters, but away from the extremes, variation begins immediately, and is greatest about halfway between. It is a conspicuous example of the occurrence in a large mammal of what has repeatedly been found among small mammals."[3]

But a more surprising possibility is the intergradation of *canadensis* (the heavy-horned group) with the white *dalli* (the slender-horned group).

In northern British Columbia, we sometimes find horns that are mid-

[2]The Big Game of Asia and North America, London, 1915, pp. 3–5.

[3]Biol. Yukon, N. A. F., 30, 1909, p. 53.

way in type between the heavy and slender styles; as well as intermediate styles of colour. These may be, as some have claimed, mere hybrids. Others maintain that this points to intergradation; and we must not be greatly surprised if we come eventually to Lydekker's view that there is only one superspecies of Sheep in North America.

Thus, Allan Brooks writes: "Sheep that I killed west of Okanagan Lake, B. C., showed a decided tendency to run into the dark, northwest form *stonei;* but I have seen very light and very dark (almost black) individuals in the same bunch."[4]

Even more pointed are Sheldon's remarks; for they tend to discredit colour as a racial character. Speaking of a band of Sheep that he watched in the Pelly Mountains, he says:

"I was so close that, through my glasses, the colours of all the Sheep were clearly discernible; and I carefully made notes. . . . The majority of them were nearly of the same type as that of some of the Stone Sheep killed on the Sheslay River north of Telegraph Creek on the Stikine, the skins of which are in the American Museum of Natural History in New York. From a short distance, the heads appeared perfectly white, the bodies light gray, intermediate in colour between typical *Ovis stonei* and the Saddle-backed Sheep, so-called *Ovis fannini.* None had necks as dark as typical *Ovis stonei;* a few would be classed as *Ovis fannini.* Four were almost as white as the light-coloured Sheep killed on the MacMillan. Several had lambs strictly resembling their mother in colour. Four of the darkest ewes had white lambs. Three of the whitest ewes had very dark lambs. One dark ewe had two lambs, one white, one dark. The saddle-backed ewes had lambs, singly and in pairs, varying in all shades of colour from whitish to very dark."[5]

Record Horns

The longest horns of White Sheep in Rowland Ward's Book,[6] is from the Yukon, and is owned by Major L. Snyder. Its dimensions (owner's measurements) are: Length, 49¼ in.; girth, 14½ in.; tip to tip, 29¾ in.

The longest of Rowland Ward's measurements is the Yukon head owned by Capt. R. C. Dalglish, R. N. This is: Length, 47 in.; girth, 13¾ in.; tip to tip, 28 in.

Next is the Yukon head in the collection of Wilson Potter, of Philadelphia. Length, 44¾ in.; girth, 14¾ in.; tip to tip, 34½ in.

[4]Personal letter, Dec. 12, 1899.

[5]Wilderness, p. 203.

[6]Records of Big Game, 1922 ed., p. 385.

The most massive head is from Alaska, and is owned by His Majesty the King of England. It is 43½ in. long, and 15½ in. in girth; tip to tip, 26 in. Of equal girth is Surg. C. R. Rickard's Yukon head. It is tip to tip, 29½ in., but only 37¾ in. in length.

Ten heads of 40 in. or more in length are recorded; and 8 heads of 14 in. or more in girth.

Totalling the points of these heads, as a means of appraisal, we find: First, the Wilson Potter head with 94 points; second, the Major Snyder head with 93½ points; third, His Majesty the King's head with 90 points; and fourth, the Capt. Dalglish head with 88¾ points. This, of course, takes no account of beauty or symmetry. The Dalglish head is illustrated. It is a marvel of ovine beauty.

History

Several early explorers mention having seen creatures that may have been the White Sheep. Thus, Mackenzie, in July, 1789, when among the Hare Indians on the Mackenzie River, near lat. 68°, wrote: "Reindeer, Bears, Wolvereens, Martens, Foxes, Hares, and White Buffaloes are the only quadrupeds in their country, and that the latter were only to be found in the mountains to the westward."[7] As this was much too far north for the White Goat, it may have referred to the White Sheep; but is too vague to be of much value.

Richardson, in 1829, describes the Rocky Mountain Sheep;[8] but the illustration he gives is pure white, and may have been the present species, as the horns shown are nearer in type to those of the White Sheep than those of the Brown.

The earliest clear-cut recognition was in 1884, when E. W. Nelson described the pure white Alaskan Sheep as *Ovis montana dalli* (Proc. U. S. Nat. Mus., VII, p. 13).

In 1852, Dr. J. Rae brought a fine adult male specimen of the Black Sheep from the Liard River. In 1885, Col. J. Biddulph described this, and named it *liardensis*. As such, it was labelled in the British Museum, but not published.[9]

In the meantime, Andrew J. Stone, in 1897, secured a specimen from the headwaters of the Stikine River. It was described by Dr. J. A. Allen, and named *stonei* in honour of the discoverer. Now the older name *liardensis* was published, but one year too late.

[7] Voyages from Montreal, 1801, p. 76.
[8] F. B. A., I, pp. 271–74.
[9] See P. Z. S., 1885, p. 679.

During the last three decades, a sort of epidemic craze to name new species has swept over the world of zoology; so that otherwise helpful observers have added grievous and unnecessary burdens to the catalogue of regrettables. There can be little doubt that the last three listed races of Sheep are of this class. Careful revision of the group is much needed.

Range

The map shows, with something like final accuracy, the range of the Thin-horned Sheep. There are no special features, such as outlying groups, for consideration. The intergradation of the forms is nearly perfect, and is set forth in fuller detail on the map and in the illustrations facing page 298 of Sheldon's "Wilderness."

Haunts

In the great, glorious, rugged empire that extends unspoiled from Kootenai to Kotzebue, we still find the Sheep in primitive habit. The evidence of countless hunters and of their photographs, is that the Sheep is a creature of the upland meadows; but retires for rest and security to the adjoining citadels of cliff and peak; as do seabirds that spend their lives roaming the restless sea, yet must, perforce, find on the rocky shore a place in which to rest and rear their young.

Numbers

It is with more than ordinary joy that the naturalist will read the record setting forth the numbers of these superb creatures, as they were, and as they are to-day.

While cruising along the north coast of Alaska, Nelson, in 1881, wrote: "Hundreds of Mountain Sheep skins were seen among the Eskimo."[10]

In Sept., 1915, Dr. Albert B. Jones went a-hunting in the Cassiars, and saw in one day "31 Sheep, some rams"; another day, "8 small Sheep and 1 big ram."[11]

Dr. R. Allen Griffith, who hunted around Tepee Lake, of the Lake Kluane region, Yukon Territory, in 1917, writes that "on reaching the basin at the head of the canyon, we found the valley and sides of the basin clear to the top of the peaks, alive with bands of Sheep. There were surely 2,000 Sheep in sight."[12]

C. W. H. Herdeman, writing from Copper Center, Alaska, July 3, 1911,

[10]Alaska, p. 284.
[11]Field & Stream, July, 1916, p. 253.
[12]Field & Stream, Feb., 1918, pp. 824–25.

MAP VI.—RANGES OF THE BIGHORN AND THE WHITE SHEEP

By E. T. Seton, with assistance of the Biological Survey

Range of the Bighorn and its races: To-day but little changed in actual outline, but numbers within that outline much thinned.

Range of the White Sheep and its thin-horned relatives: Not changed since primitive times.

says: "From my tent as I write this, I can see a thousand Mountain Sheep, ewes and lambs, grazing just at the foot of the Glacier. To the right over the ridge, is the summer range of the rams. I can go there in two hours, and see a hundred bands of from 6 to 12 rams."[13]

A committee of the Boone & Crockett Club, wrote in their report on the game conditions, (p. 23) in 1915, of the Bighorn:

"In Yukon Territory, their numbers are undiminished. In the interior of Alaska, there is little change, except a decrease of numbers in areas tributary to mining camps. If the camps are not long-lived, the numbers are later recruited. On the Arctic ranges, the Eskimo kill great numbers of Sheep, in some places living exclusively on their meat in the winter. When they thin out the Sheep in one region, the Eskimo go to another, while in the former region, undisturbed, the number of Sheep is replenished. Yet there is great danger of Sheep extermination finally—more than in any other part of Alaska. As the Caribou within reach of the Eskimo are killed off, the danger to the Sheep increases. In the eastern section of the Kenai Peninsula, Sheep were becoming scarce. The Secretary of Agriculture immediately prohibited killing them in this section."

Dr. W. H. Chase writes concerning the White Sheep in the Alaskan Mountains: "A few years ago, the writer had the extreme pleasure of viewing a bunch of these beautiful animals, which numbered more than 1,200."[14]

In Sept., 1918, Henry Bannon, hunting in the Cassiar Mountains south of Stikine River, in the Klappan region, "saw 18 rams that day."[15] The narrative shows that ewes and lambs abounded.

Harold McCracken, reviewing "The Game Situation in Alaska," says:[16] "On a trip in 1916 into the Sheep country of the St. Elias Alps district, I saw as high as 200 of these animals in sight at one time, and several herds of around 75. I have information of as many as 1,500 being visible from a single point of view."

In the fall of 1918, William N. Beach, President of the Campfire Club, took a movie outfit to Cassiar, and secured some valuable results. His narrative contains many expressions like "this bunch consisting of 21 rams," etc.

But his numerous trips to Alaska are even better evidence. He writes me:[17]

"During the two trips I made on the northern side of the Alaskan Range

[13]Forest & Stream, July 22, 1911, p. 136.
[14]Outdoor Life, Dec., 1922, p. 416.
[15]Forest & Stream, Sept., 1920, p. 516.
[16]American Forests, June, 1924, p. 328.
[17]Personal letter, March 15, 1926.

in 1922, I camped along various sections of the Range, covering about 200 miles on the northern side of what is known as the McKinley Range. Throughout that section, White Sheep are in great abundance wherever there are good, rugged ridges. They are generally found fairly high up, although there are several places in McKinley Park where Sheep may be found on grassy slopes. We saw various quantities of Sheep each day. The largest number were in the Park on Polychrome Pass, where we counted some 400-odd Sheep. There were 238 in one bunch. These were all ewes and lambs. As we travelled to the westward along the Range, we saw Sheep nearly every day. They were mostly in bands of from 5 or 6 to 15. The largest number of rams that we saw in any one day was 88.

"The Dall Sheep abound similarly in the Endicott Range, also in the Tanana and White River sections. In the latter, they were quite badly thinned out during the Shushanna stampede, but they are now coming back. On the whole, primitive conditions prevail in Alaska, as there are but few settlers inland, and the Indians are on the decrease. The country will doubtless furnish Sheep hunting for a great many years to come."

Home Range

As usual, the home range narrows on investigation. In the Yellowstone Park, the band that ranges over Mount Everts in the summer, merely descends in winter to the canyon of the Gardiner River, not 5 miles away, but 2,000 or 3,000 feet lower. Their whole lives may be spent within a 5-mile radius.

So also, of the White Sheep in Alaska, Sheldon writes:

"The regions where Sheep exist are divided into 'Sheep ranges,' each of which is very limited (only a few miles) in area, and occupied by a group of Sheep which pass their lives on the same range, precisely as do Cattle in the unfenced portions of the West. Except for some mingling at the borders between neighbouring groups, each colony of Sheep keeps to its own range. The Sheep cling so tenaciously to their ranges, that a destructive enemy, like man, usually exterminates them before they will leave. If driven off temporarily, most of them soon return. It is a mistake to think that Sheep are driven from one region to another. Aggressive hunting kills off most of the group, and only a very small proportion migrate to other ranges. This is particularly true in regions where the mountain ranges are not continuous. But when the number of Sheep on a range increases and crowds the food supply, a gradual overflow to other regions takes place, and this overcrowding also causes an irregular migration of Sheep."[18]

[18]Wilderness, pp. 302–03.

The uniformity of their lives and needs is modified chiefly by the weather. But they follow so much of routine that their little homeland is laid out in definite trails which they use with regularity, so that they have been deeply worn by generation after generation.

Harold McCracken, telling of his Sheep hunt in Alaska, says: "I was following a trail which the Sheep had actually cut from 12 to 18 inches deep in the mountain-side; and where it crossed a small canyon, it was well cut in the solid rock."[19] What a story that tells—what myriads of feet—what centuries of use!

Social Order

The social order of the Thin-horned Sheep is like that of the Bighorned. I know of no differences.

Except during the rut, the big rams form a group by themselves, and are singularly harmonious, considering what awful rows they had not so long ago. When any trouble appears in this group, "*Cherchez la femme.*"

The ewes and lambs, new and last year's, form another band that are under leadership of a wise old lady who is, most likely, the grandma of the lot. The 3-year-old rams in the big-boy stage, being not proper company for the ladies, and not quite fit to run with the men, form a third group, as a sort of hanger-on of the ewe-band.

As among wild geese, there is always one with head up, looking around —a self-appointed sentinel. Concerning this supposed official, Sheldon says:

"After eating some lunch, I followed the sheep-trail for some distance along the crest, when I saw on an opposite mountain, separated from the one on which I was walking by a deep, narrow valley, a large band of Sheep feeding well up the side. I counted about 80 in all, mostly ewes and lambs, with a few small rams. Descending over the steep, broken rock talus to a ridge, I walked along it until the Sheep were not more than 500 yards distant in a straight line across the valley, and, concealing myself among the rocks, I watched them. Some were feeding, some lying down. About 10 three-year-old rams kept together, slightly separated from the rest. A hundred yards above was an old ewe lying on the slope, keeping an alert watch both up and down. In half an hour, when another old ewe walked up to her, she rose and went down to feed among the others, while the ewe above lay down to replace her as the 'sentinel' to protect the band.

"As the 'sentinel'! Never was the posting of guards better illustrated; and what a positive conclusion one could have drawn if not especially aroused to continue watching and observing! Half an hour passed, while

[19]Field & Stream, March, 1922, p. 1025.

the Sheep below were feeding, resting, always alert, and on the lookout for danger; the lambs were nursing and frisking. Then the 'sentinel' rose, descended, and mingled with the others, leaving none on guard in her place! Thus entirely unprotected they continued feeding, until the lengthening shadows warned them of evening, and they slowly fed upward toward the crest to lie down for the night. During all the time that I watched them, the lambs kept playing, chasing each other, butting, and running back and forth."[20]

Manners and Mating

As in the other Mountain Sheep, the present ruts in December, the craze lasting 6 weeks, from the last of November till the first week of January.

One ram appropriates all the ewes he can get, and seems good for as many as 40 or 50.

The young are born between mid-May and mid-June. They number usually 1, but occasionally there are 2; 3 have not been recorded. This chapter of their lives is vividly set forth by J. Alden Loring in the section which ends this Life.

They are weaned in August, but continue closely attached to the mother till the following May, when each has his nose put out of joint by his little baby brother now arriving. Still, he remembers that this is his mother; and, in some sense, follows her lead till his third year. Then he graduates into high school; that is, joins the semi-detached bachelor group that stands midway between the nursery and the club. This means the mother's ewe-band on one hand; and on the other, the care-free band of big, irresponsible father rams.

With these, they continue till, in their fourth or fifth year, they fight their way to a footing among the big fellows, and so establish their right to perpetuate the race.

Enemies

In the bleak, white uplands of his great North Kingdom, the White Sheep has but few enemies that can daunt his high courage. For the plague and burden of the snow, he is so well equipped that it becomes his guardian and his friend.

The mosquitoes and the gad-fly hound him little, if at all.

Leaving out the all-destroyer, man, his enemies are Wolves, Lynxes, Bears, Wolverines, eagles, Foxes, etc. But these are dangerous only while the Sheep is a helpless lamb.

[20] Wilderness, pp. 202–03.

Wolves and Lynxes are swift enough to menace the old Sheep, but their success is small. The following by Charles Sheldon shows that, in Alaska, the Sheep finds in the Lynx an habitual enemy. On Dec. 8, 1907, while at timberline, headwaters of the Toklat River, on the north side of the Alaskan Range, Sheldon saw some Sheep behaving strangely.

He says: "Going back to the creek bed, and proceeding, I soon saw on the ground, at the foot of the slope, a Sheep, apparently dead, with a bloody head. Then immediately a Lynx squatted just beside it. I was a hundred yards off, and the Lynx was looking at me. It quickly ran up the creek a short distance, and disappeared among the rocks. Following rapidly, I saw it sitting on a ledge and shot it. Bringing it back to the Sheep, I found that it had just pulled the Sheep down the slope. I had missed seeing it by a minute only.

"The snow revealed part of the story. The Lynx had waited on a rock, about 500 feet up, and as the ram (about 2 years old) crossed the slide, the Lynx sprang on its back, and fastened its teeth in the left eye. Together they came down the slide, and at the bottom, a struggle ensued. The Lynx lost its hold, and fastened again to the right eye. Not another tooth mark was on the Sheep. Both eyes were completely gouged out, and had discharged great quantities of blood.

. . . . . .

"The ram weighed 125 pounds.

"Jan. 3, 1908, I was at the base of Mt. McKinley, 70 miles distant from the Toklat, and saw on a mountain-side, high up in the slope, a Lynx feeding on a Sheep. Going up there, the Lynx ran before I could shoot it. The snow above told the story. The Lynx had waited on a rock above. Four or five Sheep had passed it going down, but did not come within 10 feet of the rock. When they got below—the slope was very steep—the Lynx rushed down behind them, and sprang on the back of a ewe and fastened its teeth to her left eye only. Both struggled 300 yards down the slope, and the ewe had died before the Lynx lost its hold. . . . The ewe was 3 years old, and larger than the ram.

"Lynx tracks were common all winter in the Sheep mountains, and several times I saw them near Sheep among the rocks, and once saw one trying to stalk a band of large rams."[21]

The Lynxes were not especially large, as they weighed 18 pounds and 22 pounds respectively. The skulls of the Sheep, etc., are now in the National Museum at Washington.

[21]Forest & Stream, Jan. 30, 1909, p. 173.

The Wolf takes a continual toll of the Sheep, when he can find them away from the crags. John C. Augsberry, of California, with his guide, Tom Dixon, of Kluane, saw 5 places in one day on the St. Clair River where Wolves had killed rams. "They saw Wolves in the act of cutting out single rams from a bunch, and Mr. Augsberry succeeded in killing one of the Wolves engaged in such a foray. The ewes and lambs kept to the higher ground and rocks, and were not molested."[22]

The Wolves and the Pass

As an offset, I am glad to quote the following account of an attack by Wolves.

Harry E. Lee, the well-known Alaskan sportsman, describes a thrilling episode in White Sheep life. He had heard Wolves in the region, and found not a few tracks. He climbed to a good lookout.

"I could not see a living creature in any direction," he says. "I sat there for about half an hour, and was contemplating a return to camp, when I heard on the opposite side of the canyon a number of sharp, quick barks or yelps. I looked in the direction of the sound, but could not see a thing. Presently I discovered two Sheep coming down the mountain, and about 10 yards behind them, 5 Wolves. The pursuers seemed to be gaining on their prey when they reached the cliffs; but the Sheep plunged down, down, until they reached a wide shelf, and here immediately they turned around and with heads to the enemy, waited the onslaught.

"The Wolves came on barking at every bound, and springing from ledge to ledge. The Sheep stood perfectly motionless. The foremost Wolf gained the shelf. Quick as a flash, the Sheep struck him and hurled him off the cliff down to the depths below.

"The other four came dashing on. As they stepped on the fatal ledge, each one was sent thundering down in the same way. I was spellbound for a few minutes. I would have given almost anything I possessed for a picture of the scene.

"The Sheep walked leisurely to the edge of the precipice and looked over; then gazed around on every side and leisurely walked back and lay down. I could easily have killed both these Sheep, but I felt so proud of them that I would almost have sent a shot at any man who would molest them.

"I am told on good authority that a large ram will defend the whole flock against any living animal that would give battle on their own grounds. I could not believe this until I saw what I have described; but now I am

[22]Editor, Field & Stream, Jan., 1920.

The Dalglish Head
from Yukon

The Wilson Potter
Head. (dalli)

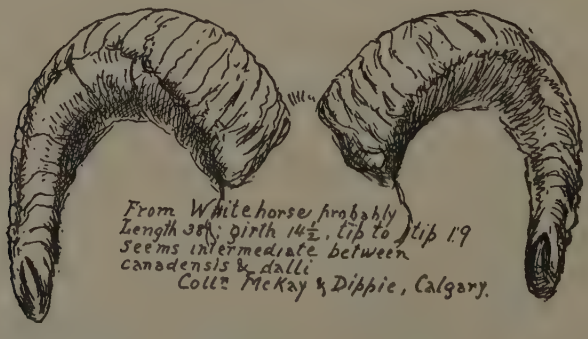
From Whitehorse probably
Length 38½; girth 14½. tip to tip 19
seems intermediate between
canadensis & dalli
Coll^n McKay & Dippie, Calgary.

Plate LXXXIII.. Remarkable Heads of White Sheep

convinced that a harmless-looking Sheep can make as fierce a fight as any animal I ever saw, when called on to defend his own rights; and so quick and effective are his blows that nothing can withstand him.

"I walked down the ravine to where the Wolves had been thrown over, and saw the mangled forms of three of them at the bottom. The other two had caught on the lower ledge and were also shattered to pieces on the sharp rocks."[23]

Good Fellowship

Reference to the Lives of Coyote, Fox, Badger, Mink, and Caribou shows that these creatures form friendships with other animals—those of a different species. It is a pleasure to add the White Sheep to the list of kindly spirits.

The following incident is supplied by Morris L. Parrish who, with Wilson Potter, both of Philadelphia, made a hunting trip on Kenai Peninsula in the fall of 1912. Parrish and his guide, H. E. Russell, were the witnesses. Parrish writes:

"Three rams were on the side of a hill, walking along in single file, and a Cross Fox was walking with them, he jumping up and biting their faces in play, and they butting him gently along in front. When they lay down, he lay down too; and they were evidently travelling together, and the best of friends. We watched them for fully 15 minutes through the glasses at about 300 yards. There was another ridge, some 200 yards farther on, and we crawled along this, but when we reached it, the rams had disappeared. We saw the Fox some distance off, but could not find the Sheep again."[24]

The Loring Lamb Hunt

Of all the hunts that I have read, none has interested me more than J. Alden Loring's Alaska expedition after the White Sheep. He set out, not on a head-hunt, but planning to bring back alive for careful raising, some lambs of the wild stock. Because the experiment was to be carried on in the East, in a damp region, and near sea level, the hunter elected to secure the Alaska Sheep rather than that of the high Rockies. The story of the bloodless hunt, so nearly a success, I gladly give, as guide and incentive to others who would follow up the good work.[25]

On April 24, 1901, he landed at Tyonek, Cook's Inlet, Alaska; and secured the services of H. H. Hicks, who, with two Indians, formed his party.

[23]Forest & Stream, April 15, 1899, p. 283.
[24]Quoted in Journ. Mamm., Nov., 1921, p. 234.
[25]See N. Y. Zool. Soc. Bull., Sept., 1902, pp. 46–55.

On the Knik River Mountains, 75 miles away, they began in mid-May to seek for ewes that were about to lamb. From various good outlooks they located two promising bands of Sheep. These they could keep under observation, as Sheep travel but little while they feed; they are satisfied with a very small home range, as is the well-known habit of their kind. For a week they watched these two bands, and oftentimes Blackbears with their families drifted across the scene.

"Hicks reported," he writes, "that for two days, one of the ewes had acted strangely, restless when feeding, lying down more than usual, and taking little interest in the wanderings of its associates. This naturally led us to believe the long-looked-for time was near."

The Capture of Little Billy

Returning to camp after some ten days' watching, he says: "Much to my joy, I found Hicks seated on a log, with a beautiful snow-white lamb standing rather unsteadily in front of him. The story of its capture is best told in the words of Hicks.

"'For some time after reaching the place where we [Hicks and Billy, the Indian boy] had watched the Sheep, the one that had acted so strangely could not be found. An hour or so later, it walked out of a gully among the rocks, a lamb following. It was about half a mile above timberline, in the centre of a mass of rocks and crags. We mapped out our route and started in pursuit. For some time we kept together. . . .

"'It took an hour and a half to climb to the point where we were to separate. Billy then followed up a canyon to the right of the Sheep, while I made a detour to the left, intending to get above them. Progress would have been easier had we been able to take advantage of favourable places without being seen. We knew that at the first sign of danger they would take to the inaccessible peaks, and probably cross the range. Our plan was that Billy should creep close to the lamb and conceal himself, while I worked between it and the other Sheep; then, when they were out of its sight behind the rocks, we would scare them, and immediately advance on the lamb.

"'The plan worked admirably. Some hard climbing was necessary before I reached a suitable position. Rising, I allowed the Sheep to see me, and an instant later they were bounding up the mountain. The lamb was on a narrow shelf, and by creeping up from both sides we blocked all chances of its escape. It scampered back and forth, but did not attempt to jump over the ledge. We worked slowly, and it quieted down until at last it ran into Billy's arms, and was our captive.

"'It took its capture as a matter of course, and did not bleat or struggle until we started for camp. In descending difficult places one would climb down, and the other hand him the lamb and the guns. I carried the lamb, and its heart beat so rapidly we paused many times for it to rest and become quiet before reaching camp.'

"This specimen was a male, a beautiful little creature not more than a day old, 10½ inches high at the shoulders, weight 8½ pounds. He scampered about with remarkable agility. He was attached to Hicks, and followed him from place to place, but when I attempted to care for him while Hicks ate, he became restless and bleated like a domestic lamb.

"Like all young ungulates, he stood with his feet braced well apart, and attempted to jump over obstacles instead of going around them. As he was warm, we waited before feeding him, then gave him his first meal of condensed milk, ¼ milk to ¾ water, from a nursing bottle. Feeding proved to be an awkward undertaking, as the lamb did not understand what was wanted. Half an hour after arriving in camp, and about fifteen minutes after feeding, he was taken with diarrhœa.

"Using poplar saplings, we made a corral about ten feet square, and placed him in it; but he was not contented unless someone was near. Whenever I left, even if for a minute only, he ran back and forth, bumping his head against the bars, bleating, and attempting to jump out. At night I made my bed in one corner of the pen, and as I expected, he shared it. He lay close to my face, and frequently snuffed at it. At last becoming sleepy he closed his eyes, and at each throb of the heart his head sank lower and lower until it rested on my cheek. It was a windy night, and at every strong blast he awoke with a start and sniffed my face, bleating frequently. I could not move without disturbing him, and often lay in one position until my bones ached.

"I got little rest until five o'clock in the morning, and then had not more than an hour's sleep until 'little Billy,' as we named him, was walking all over me. He was very nimble, sometimes trying to jump out of the enclosure. He liked to get as high as possible and whenever I raised the blanket he tried to climb it."

A fierce storm now set in and the hunters were held up for three days.

"During this time," says Loring, "I was confined to camp, caring for the lamb, and also endeavouring to break up the chills and fever which attacked me every other day. My illness subsided, but the lamb became worse, and it was soon evident that its condition was hopeless. In spite of the medicines administered, it became greatly emaciated, soon lost its appetite, and on the morning of May 27th it died lying on my blankets."

The Second Snow Lamb

They now travelled farther, and found a band of 17 Sheep, presumably all ewes.

"It was not long before a lamb and ewe were sighted. They were in an awful mass of rocks and crags, near the summit of the range.

"As we were about to give chase, the ewe started up the mountain in great haste. Her actions were puzzling, for we were sure she had not seen or scented us. At last we concluded that she was attempting to exercise the lamb. After describing a circle, she returned and lay down near the spot from which she started."

A long detour and some heavy climbing were necessary now. Then Hicks went ahead to locate the game.

"He returned with the information that three hundred yards above us there was another ewe, but he was unable, without exposing himself, to tell whether it had a lamb. We retraced our steps to a rocky peak, and under its protection sneaked to within a hundred yards of the Sheep, when we saw a lamb lying by it.

"The mother seemed reluctant to leave the little one, even for a moment, but at last she walked around a point and out of its sight. Then we allowed her to see us, and she took fright, at once. While attempting to get above the lamb, we lost sight of it. Hicks immediately climbed a cliff, and after sighting it, signalled its position to me. I sent one of the Indians to the opposite side, and stationed the other below the lamb, while I came up from the left. Everything being in readiness, Hicks climbed down from above and blocked the only passage. The lamb was resting quietly at the base of a cliff. Then we all moved forward from different directions, and soon had surrounded and captured it. It was not more than a few hours old, and because of its weak condition scarcely made any attempt to escape.

. . . . . .

"As we were about to return to camp, an eagle suddenly darted round the face of the cliff, and with wings half closed swooped close over our heads. It seemed as if the big bird intended to rob us of our prize; but probably it was as much surprised as we, for it departed as suddenly as it came. Had it been an hour earlier, and the mother and lamb separated by even a few feet, the latter surely would have been captured and devoured.

"We placed our captive lamb in a tiny hammock made out of the bottom of a flour-sack, doubled its feet under it naturally and pinned the

sides of the hammock over its back. With hammock and lamb hanging from Hicks's neck by a stout cord, the head of the captive protruding very demurely, we began to descend toward our mountain camp."

The Third Lamb

When about a mile off they saw Billy, the Indian boy, running down the mountain at breakneck speed, and ascertained through the glasses that he also carried a lamb, one which he had captured after an exciting chase—a chase which proved, alas, too much for the little one's strength; for it was so overcome that it lay still, and did not attempt to move.

Some unexpected testimony from one of the Indians at this time convinced Loring that the Sheep's milk was not thin and weak as tradition had it, but as rich and thick as cream; so he decided to try Nestle's Baby Food in the place of condensed milk, as that seemed more like what nature provides.

"The lambs were perfectly contented in the pen which we made for them. The one Billy captured was so fagged out that, regardless of the noise made about camp, it lay down and slept soundly for two hours. The other lamb sniffed at him a few times, then lay down and watched us with much curiosity. The mosquitoes were now so troublesome we made a mosquito-proof tent to place over our two small captives."

Next day, the first lamb was in good condition, and evidently much stronger. But one of the Indians had been using his gun, which with the disturbance of the lamb chase, made it probable that all the Sheep had moved out. So the hunters also moved from that mountain.

"The lambs behaved well on the way down. Neither of them struggled much, and they appeared interested in all that went on. About noon the one I carried showed symptoms of illness, and on arriving at camp I at once began doctoring it.

"A movable wire cage was made, and at night, after taking the lambs into the tent and allowing them to go to sleep cuddled close to me, I covered them with mosquito netting, and placed the cage over all. Whenever one awoke he looked about, and seeing his companion sleeping peacefully, dozed off again.

A Sad Ending

"The smaller lamb became weaker daily, and we feared it was not likely to live long. The other, however, was so strong and healthy we had great hopes of keeping it."

But at night "about 8 o'clock the strongest lamb was taken sick with

the usual disorder, diarrhœa, and by midnight was past recovery." Next morning, June 6th, between 5 and 6 o'clock, to the intense sorrow of their captor, both lambs died.

Loring thinks that the unnatural food may be to blame; but one at least was killed by the nervous excitement of being hunted down, so that it could not have digested any food. In any case, he thinks that it would be a long step toward success in the next attempt made, if domestic Goats, or Sheep in milk, were taken along to nurse the tender little captives.

It is well to remember also that there are many artificial baby foods now available. Experience in the zoo proves that most animals can be raised on them (See Goat Life). Some remarkable successes in raising little orphans have been achieved by the use of lactol—a heaping teaspoonful to a half pint of warm water. These things are easy to carry, and it is to be hoped that another attempt will be made with better equipment. Some time, it is bound to be a success.

References

1887—Report upon Natural History Collections made in Alaska, by E. W. Nelson, Signal Service, U. S. Army.

1902—The Quest for Ovis dalli, by J. Alden Loring, N. Y. Zool. Soc. Bull., Sept., pp. 46–55.

1911—Wilderness of the Upper Yukon, by Charles Sheldon.

LIFE LVIII—THE MUSKOX

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Muskox, Musk-Buffalo, Arctic Buffalo or Polar Cattle

Ovibos moschatus (Zimmermann)

(L. *Ovis*, a Sheep; *bos*, a Cow; *moschatus*, musky)

Bos moschatus Zimmermann, 1780, Georg. Geschichte, Vol. 2, p. 86.
Ovibos moschatus Desmarest, 1822, Mammalogie, Vol. 2, p. 492.

Type Locality—Between Seal and Churchill rivers, Keewatin, Canada.

French, *Bison musqué; le bœuf musqué.*
Eskimo, *Oomingmak* or *Oum-ming-mung.*
Chipewyan, *Et-jer-ré.*
Loucheux, *Uk-ki.*
Slavey, *Ota Et-jir-er.*

The genus *Ovibos* Blainville belongs to the family *Bovidæ* or Cattle-beasts. It is characterized by: Large size and oxlike form; neck, short; horns in both sexes, sweeping down, out and up; muzzle all hairy, save a small, naked triangular space between the nostrils; 4 large hoofs on each foot; tail, rudimentary; ears, small; coat, very long, thick and flowing; teats, 4.

It is nearer to the American Buffalo in anatomy than to any other existing animal; and may be described as a form of Buffalo specialized for life on the Polar Plains.

$$\text{Teeth: Inc.}\ \frac{0-0}{4-4};\ \text{can.}\ \frac{0-0}{0-0};\ \text{prem.}\ \frac{3-3}{3-3};\ \text{mol.}\ \frac{3-3}{3-3} = 32$$

In addition to these generic characters, the Muskox has the following:

Size. ♂s: Total length, 80 to 96 in. (2,028 to 2,434 mm.); tail, $3\frac{1}{2}$ to 4 in. (89 to 102 mm.); hind foot, 17 to 19 in. (432 to 483 mm.); height at shoulders, 48 to 60 in. (1,217 to 1,521 mm.).

The bull that Captain Parry killed on Melville Island., Aug. 9, 1820, measured in total length, 82 in.; tail, 3 in.; hind foot, sole to hock, 17 in.; height at withers, 56 in.

The large bull, taken by the Seton Expedition at Aylmer Lake, Aug. 16, 1907, measured: Total length, 96 in.; tail, 4 in.; hind foot, 19 in.; height

PLATE LXXXIV. MUSKOXEN IN LONDON ZOO

The two at the top show a young bull $2\frac{1}{2}$ years old. The rest are adult cows.
Photographs by E. T. Seton

at withers, 59 in. This, it should be noted, was in the region of the largest race, typical *moschatus*.

A bull killed by Hanbury in 1896 in the Ark-i-linik River country, stood 55 in. high at the shoulders.[1]

♀s: The 22-months-old ♀ that was secured by the N. Y. Zool. Park on March 12, 1902, measured as follows:[2]

Length of head and body	4 ft. 10 in.
Height at shoulders	3 " 2 "
Height at middle of back	2 " 11 "
Height at hips	3 " 1 "
Length of horns on curve	10 "
Horns apart at base	6 "

Weight. It should be remembered that "cleaned" means gralloched; that is, bled and gutted. In this process, ruminants lose about one fourth of their weight. "Dressed" means gralloched, skinned and trimmed; that is, with head, horns, and hoofs also removed. This reduces the weight to about two thirds of the live weight. These, of course, are rough-and-ready rules, varying with individuals.

Capt. W. E. Parry killed a bull on Melville Island, Aug. 9, 1820, which, according to Dr. Alexander Fisher, weighed as follows: Weight of carcass skinned and cleaned, 421 lbs.; weight of head, skin, and feet, 134 lbs.; estimated weight of entrails, blood, etc., 160 lbs.—giving live weight of 715 lbs.[3]

On Aug. 24, they killed 2 others which dressed respectively 359 lbs. and 368 lbs.[4]

Gen. A. W. Greely records 4 Muskoxen killed on Grantland in mid-July, averaging 377 lbs. dressed,[5] which probably means 600 or 650 lbs. live weight. During 1882, they killed 52 Muskoxen averaging 243 lbs. each of dressed meat.[6] On Sept. 29, 1882, they got a Muskox that dressed 371 lbs.[7]

Hanbury gives the live weight of an average bull at 579 lbs.[8]

The large bull collected at Lake Aylmer, Aug. 16, 1907, weighed

[1]Northland, p. 12.
[2]Zool. Soc. Bull., Sept., 1902, p. 34.
[3]Voy. Disc., p. 251.
[4]As above, p. 258.
[5]Three Years, p. 374.
[6]As above, p. 378.
[7]As above, p. 388.
[8]Northland, pp. 12–13.

850½ lbs., after having been bled, cut up, and dried out for a day. Of the 850½ lbs., the head, hide, and hoofs weighed 125½ lbs., and the paunch, etc., 117½ lbs., leaving 637½ lbs. clean. Therefore, allowing for the loss of blood, it was about 900 lbs. live weight—the record. The skull and teeth show that it was not very old; it was in its prime.

Thus, the evidence goes to prove that the largest individuals are in the southern part of the range, where food abounds; while those from the niggard North are reduced to almost dwarfed proportions by the environment.

Colour. The Muskox is deep brown on head and body, becoming intense black on the chin, breast, and belly; shaded into a conspicuous light brown, almost flaxen saddle in the middle of the back. Ears and head, very dark brown; front legs, dirty white; hind legs below hock, dirty white, becoming white behind and above the hoof; upper side of tail, black; under side pure white, but lost in the long hair of the buttocks, which is black. Lips, in front, white; horns and hoofs, dull horn-gray; horn tips, ivory-white.

Iris, golden brown like that of a Sheep, with small horizontal pupil.

Sexes are alike in colour, except that in the doubtful race *niphoecus*, the female is less black than the male; and has more or less white about the face.

Albino. "On the 18th June," says M'Dougall, "Cape Smyth [Melville Id.] was reached. When about 4 or 5 miles to the westward, Lieut. Mecham observed several animals in a broad ravine between the high lands skirting the sea. One being white, he supposed to be a Bear; but on approaching within 150 yards, the animal proved to be a *rara avis* indeed, being no other than a white Muskcow, with a young black calf, about 4 months old, grazing beside her. A ship's length apart, another cow and calf, both black, were also grazing."[9]

Coat. The coat is of deep, brown dense wool, covering the whole body, overlaid and hidden by long, coarse hair, which on the legs and underparts, constitutes a fringe a foot or more long; at the sides, 18 in. long, on the throat and on the rump, 20 in. or more.

Hanbury says: "I was surprised to notice how little difference there was between the summer and winter coats of the Muskox. At this date, Aug. 12, one would naturally expect the robes to be worthless, but they were quite handsome. The fact is that the long black hair, which often reaches nearly to the ground, is never shed. Once this undercoat of wool has been rubbed and scraped off, the robes are good and certainly worth preserving. The trees and bushes along the river were loaded with this wool, which is very fine in texture, much resembling the pashmina of Kashmir. Bags of

[9]Resolute, pp. 295–96.

this wool could be collected from the bushes. It would be a novelty to have a shawl made of it."[10]

The long, coarse hair, if it falls, is renewed gradually, like the mane and tail of a Horse. Its functions chiefly are to shed the rain and protect the animal from violence. The thick underwool, is, of course, essential to warmth at all seasons.

With a view to experiments in weaving the product, the keepers in the Zoological Park, N. Y., once combed out all the wool of a 2-year-old Muskox at the shedding time—late spring. It was a long and tedious operation, and about one month later (though this was summer and the Muskox is bred for Arctic winter), that particular Muskox died of pneumonia;[11] showing how dangerous a thing it is wholly and suddenly to lay aside one's underflannels.

The skin of foetal calves is covered with short, dark brown, curly hair, and furnishes a favourite material for winter caps in the North.[12]

The Eye. "The projection of the orbits of the eyes in this species is very remarkable; . . . it is probably a provision to carry the eye clear of the great quantity of hair."[13]

This observation applies equally to the tubular orbits of the Buffalo. There are, however, some tubular orbits which serve a different purpose; such as those of the Hippo, the snapping turtle, the frog, and the crocodile, which are arranged so as to be above the water when all else is submerged; also of certain burrowing rodents whose safety lies in being able to see from their holes when their bodies are out of sight.

The Musk. No one has yet located the source of the musk in this species; therefore, it is likely to be the product of minute glands all over the skin.

The practical elimination of the tail is very rare among bovines. In this family, the tail is usually specialized as a fly-flapper. In the Muskox it is, according to Richardson, reduced to 6 vertebræ, much as in the human species.[14] Obviously, the Muskox has found a different and better solution of the fly problem.

It is worthy of remark that the Muskox has abandoned his tail and developed an intensely musky personality; the Muskhog has abandoned his tail and developed a powerful musk-gland on his back; the Musk-deer has abandoned his tail and developed an overpowering musk-gland on his

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[10]Northland, p. 40.
[11]Reindeer and Muskox, p. 16.
[12]Russell, Far North, p. 234.
[13]Parry, Voy. Disc., 1821, App. p. xcx.
[14]Zool. Herald, 1854, p. 81.

belly. All of these animals live in regions where mosquitoes are a pest; maybe the musk is developed for a protection against them.

The Yak furnishes further light on this, for he lives in climate and surroundings like those of the Muskox range. His home is cursed with mosquitoes, but, having evolved no musk, he has developed an enormous bushy tail for a fly-flapper.

Flesh

The flesh of the Muskox is much like beef—like Buffalo indeed. When in prime condition, layers of fat are to be found on the neck, which is then the best part of the animal to eat. Sixty pounds did Hanbury get of this delicious flesh-butter from one bull killed in August. But the fat does not form on the back as it does to make the back-fat in the Caribou.

There is, however, this one bad feature about the beef of this animal: It commonly bears a dominating, insupportable taint of musk. This is strongest in the old bulls, and least in the young calves; strong in the lean animals, and barely perceptible in the fat. But all are, in some degree, permeated with the musk at all seasons of the year.

On several occasions in the August of 1907, I made a meal of Muskox beef. The musk was scarcely noticeable during the meal. But afterward, for hours, I had strong and unpleasant reminders of the experiment.

Gen. A. W. Greely devoted some study to the subject—it was indeed a vital one to him—and writes: "The weight of evidence favours the belief that immediate dressing of the animal obviates the difficulty. An example of the following summer seemed to bear out this opinion: An old bull was killed, which, when running, was said to have exhaled such an odour of musk that it was perceptible at a distance of several hundred yards. It was naturally supposed, though he was immediately dressed, that the meat could not be eaten. To avoid prejudice, I had a quarter served without the knowledge of anyone except Sergeant Brainard, and the meat proved free from taint or musky flavour."[15]

Horns and Record Heads

The horns are unlike those of any other animal in America, and suggest the S-bent weapons of the African Buffalo. They give a fair idea of the animal's age. Warburton Pike says:

"The animals that we killed in this band were of various ages, and it was interesting to note the growth of the horns in different specimens. They begin in both sexes with a plain straight shoot, exactly like the horns of a domestic Calf, and it is then impossible to tell the male from the female

[15] 3 Years, p. 141–2.

by the head alone. In the second year, they begin to broaden out, and the bull's horns become much whiter and project straighter from the head than the cow's, which are beginning already to show the downward bend. At the end of the third year, the cow's horns are fully developed, and I do not think they grow much after that age; with the bulls, however, the horns are just beginning to spread out at the base, and it is not until the sixth year that the solid boss extends right across the forehead, the point of junction being marked by a slight crack into which the skin has been squeezed during the growth of the horns. A curious fact is noticeable in the horns of the young bulls before the boss has begun to form; they are quite soft and porous at the base, and can easily be cut with a knife; when once the boss has grown, the horn is as hard as a rock. I made careful inquiries of the Indians on these points, and they told me that, except in the case of very young or very old animals, they could always tell the age of the Muskox by a glance at their horns."[16]

The best pair of horns listed in Rowland Ward's Book (1922) for the Barren-grounds of Canada, is in the possession of N. J. Dinnen. It is given as follows: Length, 33 in.; breadth of palm, 12½ in.; tip to tip, 24½ in.

Next to this is J. C. Phillips's head: Length, 30¼ in.; breadth of palm, 13 in.; tip to tip, 30¼ in.

Next is Dr. M. E. Johnstone's Greenland head: Length, 29 in.; breadth of palm, 11 in.; tip to tip, 28 in.

Then comes G. L. Harrison's head from Arctic America: Length, 28¾ in.; breadth of palm, 13½ in.; tip to tip, 23¾ in.

All of the foregoing are owner's measurements. The best head listed with Rowland Ward's measurements was owned by David T. Hanbury, and taken in the Barren-grounds. It is as follows: Length, 27¾ in.; breadth of palm, 10 in.; tip to tip, 27½ in.

In the collection of E. W. Darbey, of Winnipeg, is a superb head which I measured as follows: Length, 30 in.; breadth of palm, 9½ in.; tip to tip, 27 in.

If we accept these figures and appraise these heads on their totals, we have the following:

The Phillips	head totals		74¼	points
" Dinnen	"	"	70	"
" Johnstone	"	"	68	"
" Darbey	"	"	66½	"
" Harrison	"	"	66	"
" Hanbury	"	"	65¼	"

[16]Barren Ground, p. 109.

Races

The following forms are recognized in Allen's Monograph:

moschatus Zimmermann, the typical form, a large brown animal. T. l., between Seal and Churchill rivers, Keewatin, Canada.

wardi Lydekker, grayer in colour, with more or less white on head; usually a large white patch on the face. T. l., East Greenland.

niphoecus Elliott, a small race; the males nearly all over intense black; the females and young, with white about the head and face. T. l., Head of Wager River, N. W. T., Canada.

(N. B. Dr. J. A. Allen makes *mackensiensis* a synonym of *moschatus* and *melvillensis* a synonyn of *wardi*.)[17]

History[18]

The first published account of the Muskox appeared in 1720. It was by Jérémie, a French officer who was in charge of Fort Bourbon (now York Factory), on the west coast of Hudson Bay at the mouth of the Hayes River, from 1697 to 1714; at which time Canada was yet a French possession. From this point (about latitude 57°), he made journeys northward and westward. In the country between the Churchill River and Seal River (in latitude 58° to 60°), he found the Muskoxen. His account of the Hudson Bay country, in which he gives a description of this animal, first appeared in a collection of voyages published at Amsterdam by Bernard, and is entitled "Relation du Détroit et de la Baye de Hudson"; his account of the *Bœuf Musqué*, or Muskox, being the first published description of the animal, and the only one for the next 75 years based on actual observation. It is here given at length in English.

"At 15 leagues from the Danish River [Churchill] is found the Seal River, so called because there are many big Seals in that locality. Between the two rivers, there is a kind of Ox which is named Muskoxen, because they smell so strongly of musk that at certain seasons of the year it is impossible to eat them. These animals have a very beautiful wool; it is longer than that of Barbary Sheep. I brought some of it to France in 1708, and I had it made into stockings, which were more beautiful than stockings of silk: I still have left here a little of that wool. This I should have the honour to send you, if I thought that it would please you, to make an experiment with it by some clever workmen.

[17]Muskox Monog., p. 177.

[18]The facts are largely drawn from J. A. Allen's Monograph.

"These Cattle, which are smaller than ours, have, nevertheless, horns much thicker and longer. The roots joined together on the top of the head, form a thick helmet, and descend alongside of the eyes almost to the throat. The end turns upward, and forms a crescent. Some of them which I have seen are so massive, that being separated from the skull, the two together weigh 60 lbs. They have very short legs, so that the wool hangs always to the ground when they walk; this makes them seem so deformed, that one can hardly tell, at a little distance, at which end they have the head. There are not many of these animals; what there are, the savages will very soon destroy if they are not restrained from hunting them; in addition to which, owing to their short legs, they are unable to run away when the snow is deep, so they are easily killed with thrusts of the lance."[19]

This earliest account of the Muskox is quite correct, except in the weight given for the horns, "60 lbs." Of course they are nothing like this. Horns and skull together weigh about 20 lbs. when dry; or possibly, in one of unusual size, head and horns in the flesh might weigh 60 lbs. Nevertheless, this error has been repeated by one compiler after another, usually without credit.

Thus Jérémie's account of the Muskox was republished nearly in full by Charlevoix in 1744, from which source (as though it were the original), Jérémie's description of the Muskox has usually been quoted.

Dobbs, also in 1744, gave an abridged version of Jérémie's account of the Muskox, which, as he omitted to give Jérémie as his authority, has long passed for original observation; whereas it evidently rests wholly on Jérémie. Ellis, who is also cited as an original source of information, merely made, in 1748, an incidental reference to the habit of the Eskimos of the Hudson Bay region of wearing a cap "made of the skin of a Buffalo's tail" to "keep off the Musketoes."[20]

This is another important error, for, granting that Ellis meant the Musk-buffalo, it has no tail, practically. It is, as Hearne pointed out long after, the long hair from the throat and chest that is used by the Esquimaux to make their musketto wigs.[21]

"The narrative of the voyage of the ship *California* published in 1749, states that a hunting party from the ship saw '3 Buffaloes, a Bull Buffalo with 2 Cows,' in August, 1747, on the west coast of the northern part of Hudson Bay. They apparently killed some of them, as they took some of the flesh to the ship, and considered it 'remarkable that the flesh of

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[19]Relation, pp. 314–15.
[20]Voy. to Hudson's Bay, p. 232
[21]Journey, p. 138.

the Buffalo tasted Musk, and the Heart especially so very strong, that few could eat it.' The animals are described as 'much lower than a Deer, but larger bodied,' and as having short legs and very long hair; and the 'Bull's horns resembled an *English* Ram's; they run a good pace, and climbed nimbly up the Rocks.'[22]

"The second important contribution to the history of the Muskox is the account by Samuel Hearne, who during the years 1769–72, traversed the range of the Muskox from the mouth of the Churchill River westward and northward to the mouth of the Coppermine River. His observations on its habits, distribution and molt are still of the highest interest." They are, indeed, so complete and reliable that I have used them very fully in this Life.

Finally, in 1780, guided by the second-hand descriptions of Charlevoix and Dobbs, Zimmermann described and named the Muskox *Bos moschatus*.

Prehistoric Range

The ancient and prehistoric range of the Muskox seems to have been the whole north Polar region, and southward to cover most of what is now Canada, and the northern half of Europe and Asia. But the remains that justify this statement are mostly of the Pleistocene Period, or during the last Glacial Epoch.

Among fossil records that date back to Pleistocene days, the following are of interest:

In Klondike district, R. G. McConnell found remains of Muskox, Mammoth, Buffalo, Bear, Mountain Sheep, and Mountain Goat, associated in the "low, level, Creek Gravels, probably Pleistocene."[23]

Upper Porcupine River, Yukon, is represented in the British Museum by a "hinder portion of the cranium of a small individual with a part of the horn-cores" from the Pleistocene deposits.[24]

A tooth of a Muskox was found in the Pleistocene Gravel near Midway, B. C. This is on Rock Creek, 8 miles above its junction with Kettle River, 4 miles north of the U. S. boundary; i. e., long. 119 W., lat. 49 N. Dr. George M. Dawson records a Muskox skull from the old gravel near Edmonton, Alta.[25]

On the map are additional records copied from J. A. Allen's map.

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[22]Drage, Voyages, 1749, II, p. 260.
[23]Rep. Klondike Gold-fields, 1905, p. 28B.
[24]R. Lydekker, Cat. Fos. Mam. Br. Mus., Pt. II, 1885, p. 38.
[25]L. M. Lambe, Ottawa Nat., Apr., 1907, pp. 15–16.

These seem to carry the Muskox south to Iowa, Indiana, Michigan, and Pennsylvania.

Packard says on p. 266 of his "Labrador Vertebrates": "The Labrador Eskimo name of *Bos moschatus* is Umingak." Then adds on p. 270: "As noticed in the list above given, the Labrador Eskimo have a distinct name for the Muskox. It is naturally inferred from this interesting fact that this species must formerly have ranged as far south as lat. 56°–58° on the Labrador Peninsula."[26]

This very poor evidence is absolutely all I can find to show that the Muskox ever inhabited Labrador. Wilfred Stearns was mistaken when he recorded a Muskox "relic" from Labrador on the authority of Packard. I find no statement but the above.

In the Old World also the Muskox was widely dispersed. Lydekker says that its range was by no means limited to the Western Hemisphere. Crossing Behring Strait, remains of these animals occur in the tundra of Siberia as far westward as the Obi River. From this region, 2 skulls were brought by Pallas.[27]

These, however, are not recent remains. They may be pre-glacial, and may represent a different species.

West of Mackenzie River

Fixing the range of our Muskox in early historic times—i. e., up to 100 years ago—is nearer our present purpose than the study of fossils. Apparently it was distributed over all of northern Canada, Alaska, and Greenland. The whole region that was bare of ice in summer, and north of the timber line on the map, was probably the range of the species up to 1800.

The records which show the recent dispersal of the Muskox in the Western Tundra are as follows:

First, the much-quoted "Muskox remains" found in the ice cliff of Eschscholtz Bay. Of this, I have made a full investigation.

On several pages of Beechey's Narrative[28] are references to Muskox remains associated with those of the Elephant on Eschscholtz Bay.[29]

In the Appendix, Vol. II, p. 595, Prof. William Buckland, who reported on these fossils, says that only one Muskox specimen was brought. "1 skull with horns attached, incomplete and very modern." Again on p.

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[26]List of Vertebrates observed at Okak, Labrador, by Rev. Samuel Weiz, with annotations by A. S. Packard, Jr., M. D., Proc. Bost. Soc. Nat. Hist., March, 1867.

[27]Wild Oxen, Sheep and Goats of All Lands, 1898, p. 145.

[28]Narr. Voy. Northern Pac., 1831.

[29]As above, pp. 322, 323, 324, Vol. I.

597, he says of this: "Head of a Muskox with the external case of the horns still attached to it, which was brought home with the fossil bones, and was found with them on the beach at the bottom of the mud cliff of Eschscholtz Bay; but so slightly decayed that it seems to have been derived from a carcass that has not long since been stranded by the waves. This head of a Muskox is not engraved, as it cannot be considered fossil."

On p. 606, Buckland suggests that this carcass probably drifted there on some water current, as evidently it was not coeval with the Elephant's bones.

On p. 324, Beechey says of an Eskimo who joined them: "His party lived a long way up Buckland River (which is the small stream entering Eschscholtz Bay from the south), and were acquainted with the Muskox; which I am the more particular in remarking, as we had never seen that animal on the coast."[30]

In short, the Muskox was still found in Alaska, but not at that place; and the only specimen seen was a flood-borne skull that happened to get stranded on a mud-bank near the ice-cliff. But it was a recent specimen, and merely the southmost record for Alaska.

"From Indian information," says Richardson, "we learn that to the westward of the Rocky Mountains, which skirt the Mackenzie, there is an extensive tract of barren country which is also inhabited by the Muskox and Reindeer."[31]

According to John Murdoch, just before leaving Point Barrow, a skull of a Muskox "was brought in by one of the trading parties from the eastward. . . . In the hurry and excitement of the time, we neglected to find out more accurately the locality from which it came. The party had been as far east as the Colville, and the skull may have been brought from there. The natives knew the animal well, and called it by nearly the same name as the eastern Eskimos, but none had ever seen it alive."[32]

Russell says: "The Muskox was formerly common between the Mackenzie and Behring Straits, as evidenced by the remains which are scattered over the tundra. The oldest natives at Point Barrow say that their fathers killed Muskox which were then abundant."[33]

The most interesting and detailed record of all is by Charles D. Brower, who has spent most of his life as a trader at Pt. Barrow, the northmost point of Alaska. He writes to the New York Zoological Society as follows:

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[30]Narr. Voy. Northern Pac., 1831, p. 324.
[31]F. B. A., I, p. 276.
[32]Rep. Exp. Pt. Barrow, 1885, p. 98.
[33]Far North, p. 235.

Statement of Charles D. Brower [*May, 1911*]: "I have lived at or near Point Barrow, Alaska, for 26 years. When I first went there (1884) there was still alive an old Eskimo native who had killed Muskoxen with bow and arrow. Although I was then unable to understand the language of the natives, a few years later I was told the story by a man who, when he was a small boy, had gone hunting with his father and family, and had seen his father kill Muskox in this section.

"The man's name was Mungelo, and he was a native of Cape Smythe village. At the time Maguire [of the *Plover*] wintered at Point Barrow [1853] he was 2 or 3 years old. (This is given to establish a date.)

"A few years after this, times were hard at Point Barrow, and no Seals were to be had during the winter. The natives were very hungry, many dying from starvation. Mungelo's father packed his sled and went inland to the southeast of the village, about 9 miles, camping on the banks of a small river called Oo-ming-muc, which in the Inuit language, means Musk-ox. It is one of the tributaries of the Koog River, which empties into Wainwright Inlet.

"Here Mungelo's family hunted all the spring, and killed many Muskoxen, and saved much meat, which Mungelo's father afterward gave to his unfortunate friends who were starving.

"In travelling around the northern part of Alaska, I have many times seen Muskox skulls lying about on the tundra, and at times have taken them to my station at Cape Smythe. Only once was I fortunate enough to find a skull with the horns attached to it. That was in the summer of 1895. I was on a hunting trip about 100 miles east from Point Barrow, on the shore of a large lake, called by the Eskimos Tashispun, just west of Colville.

"There I found a skull with its horns still attached, and in a fairly good state of preservation. The under side of the big bend in the horns was decayed, where they had been resting on the ground. This skull I took home with me, and kept it for over 2 years, when I gave it to Mr. E. A. McIlhenny, who spent the winter of 1897–98 at Cape Smythe, collecting all kinds of natural history specimens.

"I have also at the present time a Muskox skull without horns, at my home at Point Barrow, Alaska."[34]

In Dec., 1916, the N. Y. Zoological Society received from this same observant trader a Muskox skull, that he found associated with Mammoth and Mastodon remains in the extreme north point of Alaska. The skull was quite fresh-looking—had apparently not been weathering for more than 30 years. Its lower jaw is missing, but the horns are intact,

[34]Zool. Soc. Bull. May, 1911, pp. 754–55.

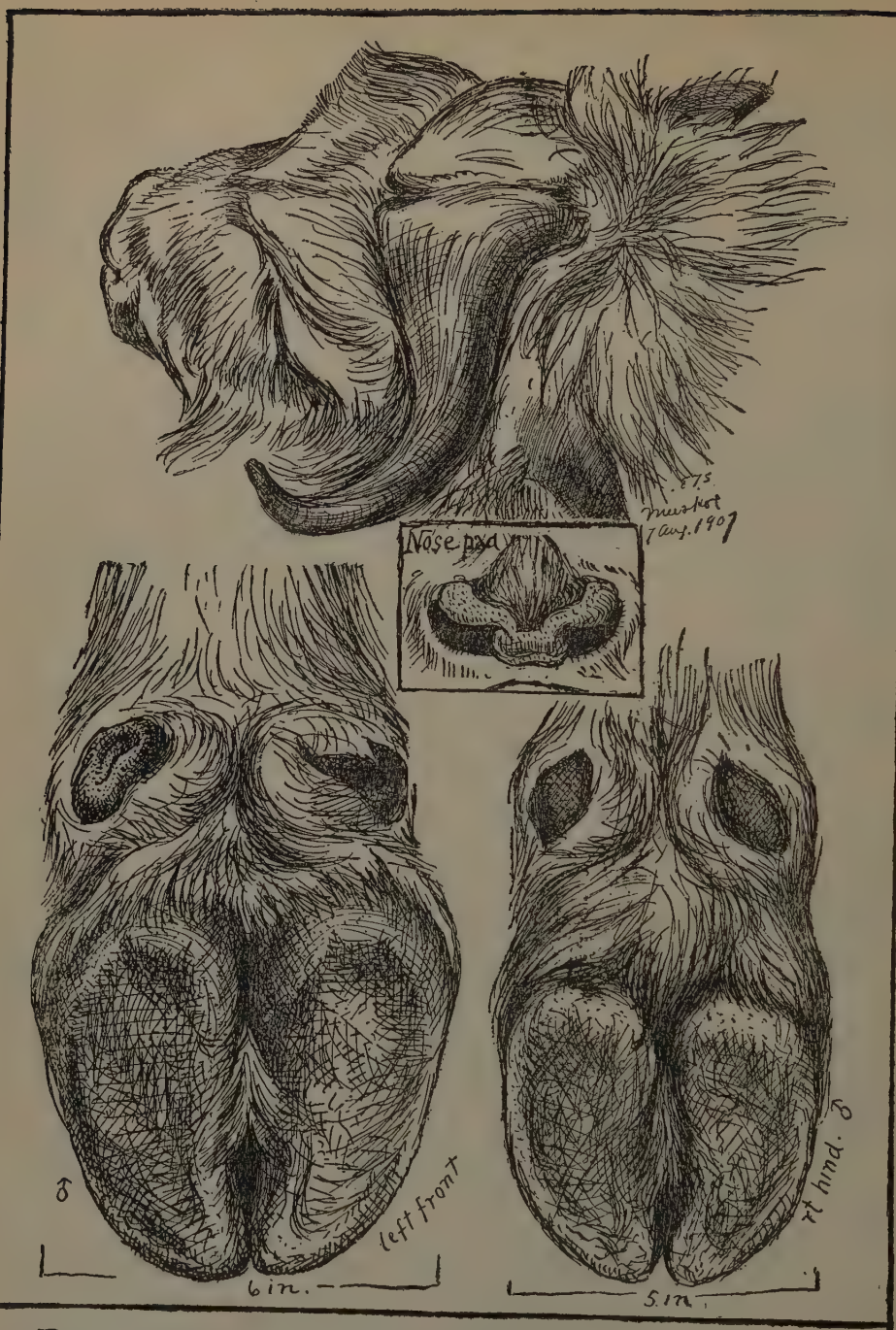

Plate LXXXV. – Details of bull Muskox
by E. T. Seton, 17 August, 1907

save for one tip that was sawn off with a very blunt instrument. The operator began sawing off the terminal half of the other horn, but fortunately did not finish.[35]

Dr. R. M. Anderson contributes the following notes to Allen's Monograph:

"*Herschel Island.* In August, 1908, Mr. Stefansson and myself found an old Muskox skull on the southwest sandspit of Herschel Island, Yukon Territory, Canada. It seems hardly probable that this skull was brought from the Franklin Bay region by whaling ships, both on account of its weathered appearance and the fact that the harbour for ships is at the other end of the Island.

"*Arctic Coast of Alaska.* June 24, 1909. Found part of an old Muskox skull (frontal bones, base of skulls and part of each horn core), water logged and green with moss, half buried in the mud of a beach, about 3 feet from the bank, near the mouth of a little creek about 2 miles west of the western mouth of Colville River, Alaska.

"June 2, 1909. Muskox remains were found in Colville River Valley.

"Panniyulak, one of the older and most prominent men in the Colville region (Alaska), told us that there is a Muskox skull in a good state of preservation on the west side of Kupuk Island, Colville Delta, about 5 miles below the mouth of the Stkillik River (the largest eastern affluent of the Colville, near its mouth). This skull was also known to other natives in this village. None of the men here, the oldest probably 60 years of age, have ever seen a living Muskox, although all have seen skulls and bones at various places on the level country (coastal plain) but none in the mountains."[36]

Anderson sends me the new record of part of a skull found by Dr. E. DeK. Leffingwell in a low bank of frozen muck, Camden Bay, 10 miles east of Collinson Point, Alaska.[37]

Thus we are bound to believe that 100 years ago, the Muskox was found on the main Barrens of Alaska and Yukon; that is, the Arctic region west of the Mackenzie. But it could not have been numerous or some of the white explorers would have run across it, or seen its robes among the natives. Probably the last were killed about 1850—certainly before 1865.

Historic Range Southward

The earliest account of the Muskox with information on its range is that of Jérémie, about 1700, as already cited in the historical chapter. The

[35] W. T. Hornaday, N. Y. Zool. Soc. Bull., Jan., 1917, p. 1445; photos.

[36] R. M. Anderson, in Muskox Monog., p. 186.

[37] Personal letter, April 23, 1926.

next important testimony in fixing the recent southern range of the Muskox in Canada, is that of Samuel Hearne, who set out on foot from Prince of Wales Fort (Churchill). On June 23, 1770 (being between Seal and Kazan rivers), he saw and shot 3 Muskoxen.[38] On July 17th, when not far from Yath-Kyed Lake, he "saw many Muskoxen, several of which the Indians killed."[39]

Later, in referring to this part of his journey, he says: "We saw a great number of them . . . before I had got an hundred miles from the Factory [Pr. of Wales Fort], and indeed I once perceived the tracks of 2 of those animals within 9 miles of Prince of Wales's Fort."[40] This shows that, at that time, they were still found in the region down to the edge of the forest.

The southmost record at hand is well within the forest belt; and is given by E. A. Preble as follows:

"Through the kindness of Dr. Alexander Milne, of York Factory, I obtained what is probably the most southern authentic record of the occurrence of this animal. Several times during the summer of 1897, parties of Indians reported seeing a pair of Muskoxen on the 'Barrens' about halfway between York Factory and Fort Churchill. The male was finally killed in August, and the head was brought by the Indians to York Factory. This pair had probably wandered beyond the limits of their normal range during the preceding winter; and for some reason, failed to return northward."[41]

Throughout the country traversed in his journey northwestward to Coppermine River, Hearne found the Muskox abundant. That is, he encountered them as soon as he entered the treeless region, the prairies of the North; and saw them in abundance in every part that he visited.

But there are many winter harbours for whalers' boats in the adjoining parts of Hudson Bay; and it is the custom of their folk to send out parties to find the Muskox, and kill all they find. We have few records, but the following seem to prove that Muskox are no longer found south of lat. 65° in this, their principal range.

J. W. Tyrrell travelled with his exploring party from the east end of Lake Athabaska down the Telzoa or Doobaunt River to Chesterfield Inlet on Aug. 18, 1893, and saw no Muskox, or sign of them, till at 6 miles north of Doobaunt Lake, lat. 64°.[42]

[38] Journey, p. 31.
[39] As above, p. 38.
[40] As above, p. 135.
[41] N. A. F., 22, 1902, p. 44.
[42] Sub-Arctics, p. 104.

Hanbury writes on Aug. 8, 1901: "After ascending the main Ark-i-linik River for about 35 miles [that is above its junction with the Doobaunt], Muskox tracks commenced to get very numerous. The muddy shores in places were so ploughed up with them as to give the idea that a drove of Cattle had passed along.

"On Aug. 9, our eyes were gladdened by the sight of a band of Muskoxen, numbering 18."[43]

In 1907, I explored for 15 miles north of Aylmer Lake, and found only one Muskox and few signs. In this region, 10 years before that (1898), Buffalo Jones had found them common.[44]

Capt. Geo. Comer writes in 1912: "They range along the coast of Hudson Bay from Chesterfield Inlet to Repulse Bay. . . . They are not found, however, on Melville Peninsula nor in Baffin Land, and the natives of the present day have no remembrance of their ever having been there. I do not think they are found south of Chesterfield Inlet or Baker Lake. They are quite numerous west and northwest of Wager Inlet. Last winter (1911–12) 40 were taken by the Eskimos. I was unable to get their skins as they were held for the Hudson's Bay Company. It is from this locality that I obtained the specimens for the Field Museum in 1896, and for the American Museum in 1902."[45]

In the great triangle which lies south of Chesterfield Inlet, therefore, the Muskox was abundant in Hearne's time, 1774, and is wholly wanting to-day. The extermination was almost certainly accomplished by whalers in the middle of the 19th Century.

Between the Mackenzie and Coppermine Rivers

Here the extermination was almost completed during the first few years of the present century. Dr. R. M. Anderson's notes, published by Allen,[46] include the following passages:

"*Liverpool Bay.*—April 14, 1910. While camping in the south west part of Liverpool Bay, Memoranna (Jimmy), one of the most trustworthy Eskimos of this region, about 35 or 40 years old, told me that formerly Muskoxen were often killed on the west side of Liverpool Bay, and that he had seen 2 here when he was a boy. Since that time (probably 25 years ago) none had been heard of west of Cape Bathurst.

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[43]Northland, pp. 11–12.
[44]Buff. Jones, 1899, p. 371.
[45]Muskox Monog., p. 191.
[46]As above, pp. 186–87.

"*Extinction in region around Franklin Bay.*—I have information from numbers of whalers, as well as natives of the region, that Muskoxen were frequent around Langton Bay, and in the highlands on the west side of Franklin Bay as far north as the mouth of Horton River, as late as 1897. During 1897–98, 4 ships wintered at Langton Bay, and over 80 Muskoxen were killed, mainly by Alaskan Eskimos hunting for the ships. Some of the meat was hauled to the ships, but the bulk of the animals were killed too far away for the meat to be hauled in, and most of the robes were left out too long in the spring thaws, so that very little use was made of anything. Since that time, no traces of living Muskoxen have been seen in the region, either by natives who occasionally hunt there, or by our party during over 2 years. Muskox heads, horns, and bones are occasionally found on the ground.

"The same winter that the ships were at Langton Bay, Akpellik (an Alaskan Eskimo) killed a herd of about 20 Muskoxen near the coast, about the middle of the east side of Darnley Bay, near the base of a small range of conspicuous rocky hills.

"*Last record of Muskoxen seen by western Eskimo.*—Somewhere between the years 1898 and 1905, 4 Alaskan Eskimo hunters made a long expedition after Muskoxen. Ascending a fairly large river which enters the east side of Darnley Bay, they travelled inland (southeast) for 9 days before seeing Muskoxen, and finally killed 27 in 2 bands. These skins with some heads were sold to whalers at Baillee Island. Coming out, they travelled north 6 days before they struck the Arctic coast, $4\frac{1}{2}$ days east of Cape Lyon. From the circumstances of their account, it is practically certain that these hunters went as far east as the lake which is the source of Rae River. The Rae River Eskimos, at the western end of Coronation Gulf, from Mr. Stefansson's account, know little about the range of the Muskox, and many had never seen the animal. It is probable that a few Muskoxen may still be found in the high, rocky uplands at about the centre of the triangle bounded by Darnley Bay, Coronation Gulf and Great Bear Lake.

"In our winter traverse from Langton Bay to Great Bear Lake, on January 5, 1911, we saw old tracks and dung on the snow which were declared by the Slavey Indians in our party to be those of Muskoxen. This was on barrens 40–50 miles northwest of Dease Bay, Great Bear Lake."[47]

According to Dr. J. A. Allen's map, there was still a small band of Muskoxen surviving northwest of Great Bear Lake in 1913.

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[47]Musk. Monog., p. 186.

PLATE LXXXVI.—PAIR OF MUSKOXEN IN WASHINGTON ZOO, SHOWING THEIR DEVELOPMENT FROM YEARLINGS TO 4-YEAR-OLDS

Photographs by E. T. Seton

Muskox at Great Bear Lake. David T. Hanbury describes the killing of 2 bulls in Aug., 1902, in the sparsely timbered country between Dismal Lake and Dease River.[48]

"We spent the greater part of the winter of 1910–11 on the east branch of Dease River and eastern end of the Great Bear Lake, and saw no recent signs of Muskoxen. Two or three years before, the Bear Lake (Slavey) Indians had made a big hunt in this region and killed about 80. During the winter we were there, the Indians had made an unsuccessful hunt to the northeast of Great Bear Lake, seeing no signs; but later in the winter (February or March, 1911) had seen 3 on 'Caribou Point' (the great Peninsula between Dease Bay and McTavish Bay, Great Bear Lake), and had killed all three.[49]

"*Dease River, N. W. T.*—In the summer of 1910, Mr. Stefansson and his Eskimos found numerous Muskox droppings of the previous winter around the Lake Immaernirk, the head of Dease River. None were seen the following winter, however.[50]

"*West end of Coronation Bay.*—Apparently Muskoxen are seldom if ever, found at the present time in the region around the mouths of Rae River, Richardson River or the Coppermine River. Quite a number of groups of Eskimos hunt in this region and they say that Muskoxen are all farther to the east.[51]

"*Coronation Gulf.*—Eskimos in a village about midway between Home Island and Epworth Point, Coronation Gulf, told us (April 15, 1911) that there are many Muskoxen on the mainland around a river called Kogyuktuayuk (about at the Tree River of charts, some 75 miles east of the mouth of the Coppermine River).

"They said they often see Muskoxen near the seacoast, but seldom hunt them, because they have only bows and arrows, and are afraid. These people had heard of people to the eastward (near Kent Peninsula) who have guns, and kill many Muskoxen.

"Eskimos from the country west of Kent Peninsula came to the schooner *Teddy Bear*, near the mouth of Coppermine River, in the spring of 1911, bringing about 30 Muskoxen skins with them.

"May 31, 1911, while hunting for traces of Muskoxen in the above mentioned region, we found several Eskimos who had been camping a few miles inland for some time, and these told us that they had seen no Musk-

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[48]Northland, pp, 225–234.
[49]R. M. A.
[50]As above.
[51]As above.

oxen that spring. They say the Muskoxen keep pretty far inland in spring and in early summer, and come to the coast later in the season."[52]

Dr. R. M. Anderson writes me that during the winter of 1924–25, the Eskimos killed what was probably the last remnant of the Muskox west of the Coppermine River.[53]

On the Polar Islands

The map sets forth the main facts of distribution on the Polar Islands, but the following records are worthy of repetition here as "nail heads of the carpet."

Victoria Island. Dr. R. M. Anderson says: "From information which Mr. Stefansson received from numerous groups of Eskimos in Coronation Gulf, Dolphin and Union straits, and Prince Albert Sound, it seems probable that no Muskoxen at all are found in either the southern or central portions of Victoria Island (i. e., Wollaston Land, Victoria Land, Prince Albert Land). Muskox horn implements among these people are said to come from eastern Coronation Gulf, or the mainland south and east of this region.

"Some of the Eskimos of Prince Albert Sound remember of the former occurrence of the Muskox around Minto Inlet and Walker Bay, but say that there are now none in that region. These natives say that up to 15 or 20 years ago, they occasionally made hunting trips across to the north side of Victoria Island (Collinson Inlet) and found Muskox there. It is their belief that Muskox are still found near the north coast of the island.

Banks Island. "I have talked with a reliable Eskimo (Kotzebue Sound, Alaska), who was with us 4 years, concerning Muskoxen in Banks Land. He had gone ashore one day several years before, near Cape Kellett (west side of Banks Land) to try to kill Caribou for a whaling ship, and saw numbers of Muskox skulls on the land. Eskimos who winter on the ice between Cape Collinson and De Salis Bay, say that the Muskox sometimes come down to the coast in winter."[54] There can be little doubt that the Muskox of Banks Island have been extirpated by the Eskimo themselves sometime between 1850 and 1870.

Melville Island. Capt. W. E. Parry's visit to Melville Island is full of interest to the naturalist. Reindeer and Muskox were frequently seen. On p. 78 he says: "We saw to-day for the first time a herd of 8 or 9 animals, feeding near the beach, which from their dark colour, we supposed to be

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[52] R. M. A.

[53] Personal letter, April 23, 1926.

[54] R. M. Anderson, in Muskox Monog., p. 187.

Muskoxen." The records of the voyage show that the Muskox were found in considerable numbers on the island.[55]

According to Frank C. Hennessey, "Muskoxen were abundant on Melville Island" (winter 1908–09).[56]

In Grant Land, 1881, A. W. Greely found the Muskox abundant wherever there were grassy valleys. He records it chiefly from the east coast, and mentions Ft. Conger, lat. 82°, long. 65°; Muskox Valley, lat. 81½°, long. 70°, where it was abundant; and Cape Sabine, lat. 78° 50,′ long. 75°, where he found traces.[57]

Parry, describing the Eskimos of Clyde River about lat. 70° west coast of Baffin's Bay on Baffin's Land as spotted on the map, says:

"They call the Bear *Nennook;* the Deer *Tooktook;* and the Hare *Ookalik;* being nearly the same words as those used on the eastern coast of Baffin's Bay. As it was considered a matter of some interest to ascertain whether they were acquainted with the Muskox, a drawing of that animal was put before the men who were on board. The small size of it seemed, at first sight, to confound them; but, as soon as a real head and horns were produced, they immediately recognized them, and eagerly repeated the word *Oomingmack*, which at once satisfied us that they knew the Muskox, and that this was the animal spoken of by the Esquimaux of Greenland, under the same name, somewhat differently pronounced."[58]

But, so far, there is not one definite, positive record for Baffin Island. Commenting on this, Capt. W. E. Parry says:

"It is a curious fact that the Muskox is very rarely found to extend his migrations to the eastward of a line passing through Repulse Bay, or about the meridian of 86° west, while, in a northern direction, we know that he travels as far as the 76th degree of latitude. In Greenland, this animal is known only by vague and exaggerated report; on the western coast of Baffin's Bay it has certainly been seen, though very rarely, by the present inhabitants; and the eldest person belonging to the Winter Island tribe had never seen one to the eastward of Eiwillik, where, as well as at Atkoolee, they are said to be numerous on the banks of fresh water lakes and streams. The few men who had been present at the killing of one of these creatures, seemed to pride themselves very much upon it. Toolooak, who was about 17 years of age, had never seen either the Muskox or the *kablee-arioo* [Wolverine], a proof that the latter, also, is not common in this corner of America."[59]

[55] Voy. Disc., pp. 254, 258, ff.
[56] Allen, Muskox Monog., 1913, p. 201.
[57] 3 Years, pp. 61, 417, 710, etc.
[58] Voy. Disc., pp. 286–87.
[59] 2d Voy., p. 512.

In Greenland

It is probable that every part of Greenland that has herbage, was pasture-land for the Muskox in primitive days. And that implies that all Greenland was stocked with Muskox in the recently past Warm Age that relieved that vast island of its icy cap. To-day, they are found along the narrow strip of grassland that begins on the west shore near the south part of Smith's Sound, and continues around the north shore and down the east shore to lat. 70°. The records affirming this are as follows:

"The observations of our parties extended the range of the Muskox (*Ovibos moschatus*) to the Greenland coast. None of us saw a living specimen; but the great number of skeletons, their state of preservation, and probable foot-tracks, when taken in conjunction with the information of the Eskimo, leave me no room to doubt but that these animals have been recent visitors."[60] The place indicated was about lat. 79°, long. 68°.

Brown, in his "Mammals of Greenland," p. 352, says that Dr. I. I. Hayes found at Chester Valley (lat. 78½° N.), on the east side of Smith's Sound, "among the Eskimo *kjoekken-moeddings*, the skull of a Muskox. Eskimo tradition describes the animal as at one time common along the whole coast; and they affirm that it is yet occasionally to be met with. No longer ago than in the winter of 1859, a hunter of Wolstenholme Sound [east side of Smith's Sound, lat. 76½°] near a place called Oomeak, came upon two animals, and killed one of them."[61]

At Independence Bay on the extreme northeast coast of the Island of Greenland, R. E. Peary found many Muskox signs, and shot 5 Muskox, July 4, 1892. This was about lat. 81°, 37′, long. 34° west.[62]

In 1895, near the same place, he saw a herd of 22.[63]

H. W. Feilden says: "We have heard of it from Polaris Bay on the northwest side of Greenland from about 81° N to Independence Bay on the northeast coast in about the same latitude; and from there, as far south as rhe 70th parallel. On the east coast of Greenland, the range of the Muskox is on a line drawn over the map from north to south embracing at least 700 geographical miles."[64]

On the east coast of Greenland, it is found down to 70½° N., i.e., Jameson's Land, according to Lieut. C. Ryder. He says: "Jameson's Land abounds in game. The Caribou and the Muskox are found in herds,

[60] Kane, Arc. Expl., p. 456.
[61] Hayes, Voy. Nor. Pole, 1866, p. 390.
[62] Northward, I, pp. 337, etc.
[63] As above, II, p. 476.
[64] Distrib. of Muskox in Greenland, Zoologist, Ser. 3, XIX, Feb. 4, 1895, pp. 1–44.

besides Bears, Foxes, Hares, and Lemmings. There are also a quantity of Birds."[65]

C. H. Ostenfeld says of the animals of North Greenland: "Among the herbivores, the Muskox is the foremost. The expedition depended chiefly upon this animal for its food, and it was mainly due to the fact that the Muskox was found only occasionally on the north coast, and in a considerable number only in one place (in one fjord), that men and Dogs suffered so much from hunger. Why the Muskox preferred this one place, we do not know. The vegetation was no more vigorous in the Muskox fjord than in other places; but in the whole district, it was so sparse that probably the limit of what a Muskox can be content with had been reached.

"This is indicated by the fact that the expedition did not meet with any calves."[66]

Haunts

The vast literature on the Muskox makes it possible to give exact details of its chosen home range. Primarily, it is an animal of the open, grassy, or scrubby plains of Canada, from the north edge of the woods to the sea. Its favourite food is grass; and favourite range the Northern prairies, on mainland or on Polar Islands, as far north as man has gone, that is, as far as there is land that is without an ice-cap in summer, and that, therefore, can grow grass.

Often, the whaler or explorer coasting along the rugged boulder-strewn hills, sees the dark brown form of Muskoxen mixed with the huge round erratics of a bygone ice-day; and, when alarmed, the Muskox scampers up steep hills and over rocks at a rate that leaves men far behind. For they are surefooted as Goats, and far more active than common Cattle.

"The Barren Ground, which they inhabit," says Russell, "is a vast area of rugged hills; most of them are boulder-strewn, with mosses, lichens, and occasional plots of short grass on slopes that have not been denuded of soil; in places, high, rolling hills of gravel occur. We invariably found the Muskox among the boulders at the summits of the highest hills. These rocks afforded but partial concealment, however, as the colour of the Muskox is too dark to assimilate readily with its surroundings at any season. They probably frequented the hilltops because the high winds, which prevail in that region, sweep away the snow, enabling the animals to graze with little digging."[67]

Sometimes, the Muskox at the south edge of its range strays into the

[65] Den Ostgrönlandske Expedition, 1891–92, pub. in Meddelelser om Grönland, 1895, p. 368.

[66] Rasmussen's Greenland, p. 298.

[67] Far North, p. 233.

wooded belt. Oftentimes, it has been seen wandering for miles into the scattering spruce, and less often, its huge Buffalo-like form is seen plunging and browsing among the willow thickets that line some of our northward-flowing streams.

Hanbury found them in the scrubby spruce woods along Arkilinik or Thelon River, Aug. 12, 1901.[68]

Roderick MacFarlane says that "during the severe cold of winter, the Muskox enters the outer sections of the forest, and is frequently found therein to a distance of 40 or 50 miles, while we have heard of more than one instance, where a stray animal had been killed at fully 100 miles from the nearest Barrens."[69] These, like the pair recorded by Preble, from near Fort York, were mere stragglers.

Not often or far does it go, into dense swampy lands; and rugged mountains do not hold its affection for long; but it enjoys them for a season, and quits them only to drift to its proper home—the wide lush grassy plains, the prairies of the North.

As one ponders this account, the thought recurs: Does not every word of this apply to the Buffalo on its primeval range? Is not, indeed, the Muskox simply a Bison, a prairie Buffalo, environed in the North, and done into terms of polar surroundings?

Numbers, Ancient and Modern

When one spreads out the Buffalo range on the plains for Anno Domini 1800, and the Muskox range for the same date, one is amazed to find that the Musk-Buffalo had at that time a dispersal about as wide as that of the Plains Buffalo. On the map, its range is about 2,000 x 3,000 miles. But there could have been no comparison between the numbers. The 50,000,000 of Plains Buffalo were probably contemporaneous with less than 1,000,000 Muskoxen.

The palmy days of the species, when it covered all Eurasia down to the latitude of London, and all America down to the latitude of Philadelphia, were long gone by, and now our information is based on fragmentary records and fleeting glimpses in sundry historic pages.

Ever to the front in matters of Northern travel and animal life is good old Samuel Hearne. On his famous journey across the Northern plains, when he got to a place which, according to his map, was lat. 69° N., long. 120° W.—that is, in the Coppermine River region, 150 miles south of that river's mouth—he found a lake of which he says:

[68]Northland, p. 39.

[69]Mack. Basin., pp. 172–73.

"This lake I distinguished by the name of Buffalo or Muskox Lake, from the number of those animals that we found grazing on the margin of it; many of which the Indians killed, but finding them lean, only took some of the bulls' hides for shoe-soals. . . .

"It has been observed that we saw a great number of them in my first unsuccessful attempt, before I had got an hundred miles from the Factory. . . . Great numbers of them also were met with in my second journey to the North; several of which my companions killed, particularly on the 17th of July, 1770. They are also found at times in considerable numbers near the sea-coast of Hudson's Bay, all the way from Knapp's Bay [120 miles north of Churchill] to Wager Water, but are most plentiful within the Arctic Circle. In those high latitudes I have frequently seen many herds of them in the course of a day's walk, and some of those herds did not contain less than 80 or 100 heads."[70]

During the year that Parry spent on Melville Island, 1819–20, his party secured 3 Muskox, 24 Caribou and 68 Hares.[71]

M'Dougall says that on Melville Island, "about this time [early summer] Muskoxen, Deer, Geese, Ducks and Ptarmigan were seen in great abundance."[72]

Lieut. George F. Mecham, who was with him, went on a side trip to Hardy Bay, Melville Island and reports: "Muskoxen were here in very great numbers. On one plain, I observed as many as 70, grazing within a circuit of 2 miles."[73]

M'Dougall seems to have hunted harder or had more luck, for his game list for about a year on Melville Island is as follows: "3 Sept., 1852, to 9 Sept., 1853—Muskoxen, 114; Reindeer, 95; Hares, 146; Bears, 6; Wolves, 3; Foxes, 51."[74]

Capt. F. L. M'Clintock, in 1857–59, killed 89 Muskox on Melville Island, and 5 on Prince Patrick Island.[75]

"In Melville Island, 10 or 15 animals make up a typical herd, and I have never seen more than 40 in a herd, strictly speaking, although I have seen over 100 scattered over a few square miles of flat land in such a way that one might take them for a single herd."[76]

As one follows the accounts of Warburton Pike, Buffalo Jones, Caspar

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[70]Journey, pp. 135–36.
[71]Voy. Disc., p. 257.
[72]Resolute, p. 275.
[73]Resolute, p. 289.
[74]Resolute, App., p. 529.
[75]Nat. Hist., etc., Greenland, etc., by T. Rupert Jones, 1875, p. 498.
[76]Stefansson, Friendly Arctic, p. 586.

Whitney, A. W. Greely, R. E. Peary, and others of Northern fame, one realizes that they had to go many miles over the Barrens to find a Muskox, and then it was a herd of a dozen or more individuals, never more than a score. Even in Hearne's time, 80 or 100 was a "great herd." And as soon as this herd was killed off,—as was easily done with Dogs and rifles,—there were no more Muskoxen in that region. The entire population for maybe a day's journey—25 miles each way—was there assembled, and permanently wiped out. For their rate of increase was very slow; indeed, the species was barely holding its own against its natural foes.

Storker T. Storkerson, of the Canadian-Arctic Expedition, 1913–18, testified before the Canadian Royal Commission, May 20, 1919, that he estimated the Muskox on Melville Island in 1917 at 4,000; "of which, he and his party killed 400 for food." (Reindeer and Muskox, p. 14.) Melville Island is about 20,000 square miles in extent; that is, about the size of Nova Scotia.

These facts help us to form an idea of the original numbers of the Muskoxen. They were never to be compared with those of the Buffalo. I suspect that never since the discovery of America, were there as many as 1,000,000; and, with a total accredited present range of about 1,000,000 square miles, it is doubtful if 50,000 Muskoxen are left alive to-day.

Possibility of Restoration

In this glum tale of woe, it is pleasant to find one reassuring note; to learn that, given relief from the toll of human slaughter, the Muskox may recover, in some degree, its range and its numbers. Doctor Allen says:[77] "It is of interest to note that, while the Muskox in Greenland has been exterminated within the last 75 years, from the southern part of its former range on the west coast, it has, within about the same length of time, extended its range southward along the east coast, having been found as far south as Scoresby's Sound, in about lat. 70°. A. G. Nathorst, in 1899, found numerous herds, where in 1822, the Scoresbys, father and son, found none, although they made considerable journeys into the interior.[78]

"The following year, Sabine found no Muskoxen at Sabine Island some 4 degrees farther north, where he spent 2 weeks, but where they have since been found in abundance. Hence, it appears that the animal extended its range southward in the course of 70 or 80 years, from lat. 75° to lat. 70°, due, it is thought, to the extinction of the Eskimos, along this part of the coast during this interval."

[77]Muskox Monog., p. 162.

[78]H. Conwentz, 1900, pp. 427–32.

Non-migratory

Most migrations are the result of food shortage induced by winters with deep snow. To this rule, the Muskox is an amazing exception.

In spite of much early misinformation, we know now that the Muskox is absolutely non-migratory. Even in its farthest north range, where winter is dark, hard, and long, and the snowfall overwhelming, the Muskox lives his hardy life unmoved by blizzards, fearless of Bears and Wolves; of every creature and hazard, native to its home, quite unafraid.

The first, I believe, to question the migratory theory was Dr. A. Fisher, 1819. "At the foot of a hill," says he, "where we saw these Muskoxen today, and along a plain that lay between it and the sea, we passed so many skulls and skeletons of Muskoxen, that I am inclined to alter my opinion respecting their migrating to the coast of America during the winter; for if they only visit this country in the summer time, it is somewhat strange that so many should die here during such a favourable part of the year. Besides, they are so well provided by nature for enduring the rigour of the climate, that the necessity for their leaving this island does not appear to be altogether so indispensable, as a person would at first sight be inclined to believe. This, however, is a subject on which much might be said for or against the question; but as I am not particularly interested on my own part, to establish the point, whether they migrate or remain here, I shall forbear saying any more about the matter, any further than that we know that Wolves and Foxes pass the winter here, and neither of them appear to be better provided for withstanding the cold than the Muskox; and with respect to food, there is certainly much more grass in the valleys in this vicinity, than they will destroy this season."[79]

One of the earliest positive paragraphs on this is from the pen of General Greely.

"Just before going into camp," he says, "Sergeant Brainard discovered on that winter's snow the dung of a Muskox, which he thought could be scarcely a week dropped. He well says: 'This should be positive proof that the animal does not migrate south with the sun and return the following year as the sun advances, as many assume to be his habit; but remains in some well-sheltered valley or ravine during the winter darkness, subsisting on whatever comes in his way.' This incident, and my personal experience, as well as that of the British expedition, leaves no doubt that the Muskox is a regular habitant of Grinnell Land and Northern Greenland the entire year."[80]

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[79] Voy. Disc., pp. 258–59.

[80] 3 Years, p. 177.

"They certainly do not migrate," says Frank C. Hennessey. "I am sure of this, not only because we found them there throughout the winter, but also for this reason: If they did migrate, it would be to the northern shore of the continent (which is just as inhospitable as where they live now), and Melville Sound is open sometimes for more than three fourths of the year, and it is open during the worst months of the year, the blizzard keeping it open.[81]

In Greely's illuminating account already cited, is a remark which is full of significance. His party was travelling westerly over Grinnell Land, or more properly, Ellesmere Island. When near Mt. Arthur, lat. 81° 20′, long. 75°, A. W. Greely wrote: "Two hours travel carried us beyond the last snow; where tracks and traces of Musk-cattle were observed, one calf being among the number; and near-by the first live willows were seen. This proves that the Muskox crosses at times to the western shore of Grinnell Land, even if he has not migrated to Greenland from the Parry Islands by way of the western instead of the southern shores of Grinnell Land."[82]

So entirely stamped out is the instinct to migrate, that Hanbury makes the following comment:

"When Muskoxen get away into a quiet, secluded little place, it is extremely difficult to find them. This bull had been here the whole summer, and had not strayed half a mile."[83]

Food

Early writers of natural history are responsible for the idea that the Muskox lives on moss and lichens chiefly. This notion was born of the belief that these low forms constituted the entire vegetation of the Northland. We know now that there is abundance of grass in many localities throughout the region; and that grass is the staple food of the Muskox, though it will vary this diet with willow browse, various creeping plants, and occasionally, moss and rock-lichens.

Hearne says: "They will feed on anything; though they seem fondest of grass, yet in Winter, when that article cannot be had in sufficient quantity, they will eat moss, or any other herbage they can find, as also the tops of willows and the tender branches of the pine tree."[84]

Capt. W. E. Parry thus describes the summer feeding range of the Muskox as he saw it, Friday, Aug. 25, 1820: "Immediately under the

[81] Muskox Monog., p. 201.
[82] 3 Years, p. 359.
[83] Northland, p. 225.
[84] Journey, p. 136.

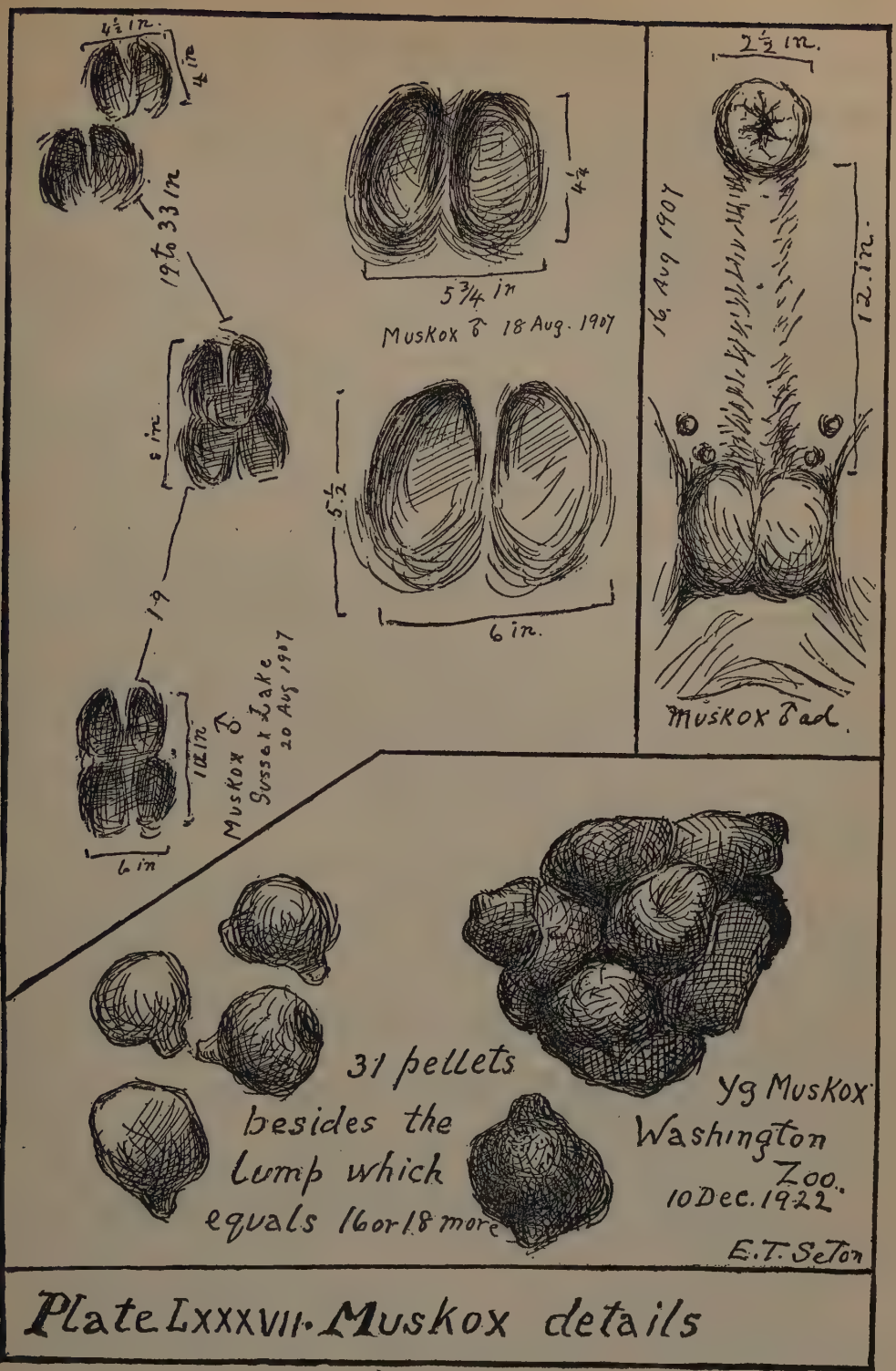

Plate LXXXVII. Muskox details

hills, which here, for the first time, in sailing from Cape Providence to the eastward, recede about two miles from the sea, was the most luxuriant pasture-ground we had yet met with on Melville Island. It consisted of about a dozen acres of short, thick grass, intermixed with moss, which gave it almost the same lively appearance as that of an English meadow. It was covered with the dung and foot-tracks of Muskoxen, of which 12 or 14 skulls were picked up near it; and it was here that the herd before mentioned was feeding."[85]

One of the best accounts of its food is given by Greely as follows: "On my way across the low divide which separated the two bays [Basil Norris Bay and Sun Bay, northeast Grinnell Land], I was fortunate enough to find 2 Muskoxen; and by taking advantage of the ground, succeeded in approaching within 40 yards of them without attracting their attention.

. . . . . .

"The circumstances were such as afforded me an excellent opportunity of observing the manner in which these animals obtain their food in winter, as they were feeding while the ground was covered with snow sufficiently deep to conceal the scanty vegetation of the valley. Moving from one patch of *Dryas* or *Saxifrage* to another, the animal with its hoof scraped away carefully the snow from the plants, and later supplemented this action by the further use of horns or proboscis, as circumstances or convenience dictated. In no case did either animal fail to first remove the bulk of the snow with its hoof.

"Their food at this time was almost entirely *Dryas octopetala* and *Saxifraga oppositifolia;* the grasses and lichens were almost entirely lacking, and in no case did I ever note a Muskox feeding on the latter vegetation, although in many places near Conger the ground was covered with scanty, minute lichens for acres in extent."[86]

Major Feilden says:[87] "Leaves and stems of willow with grasses, were in the stomachs I examined."

Hanbury killed a big bull on Dease River, Aug. 7, 1902, whose "paunch contained nothing but willows."[88]

And C. H. Ostenfeld says of the Muskox at the extreme north of Greenland:

"Wulff examined several stomachs of Muskoxen, and always found

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[85] Voy. Disc., p. 258.
[86] 3 Years, pp. 84–85.
[87] Zoologist, Vol. I, 3d series, p. 358.
[88] Northland, p. 225.

them filled with twigs of willow and, to a less degree, with leaves of anemone and other plants."[89]

The following notes on the cow Muskox in the N. Y. Zoological Park, give light on the creature's food habits, that may be of service to those who have to handle these animals in future:

The calf Muskox secured by Capt. H. H. Bodfish between Great Bear Lake and the coast, in March, 1901, was a female about one year old. She was successfully kept "on willow twigs and coarse grass from the Barren-Grounds, and finally brought to San Francisco. As soon as civilized hay became procurable, she began to eat it with relish, and her former diet of willow twigs was forever discontinued." She arrived at the N. Y. Zoological Park, March 12, 1902, when 22 months old, where she now is apparently comfortable, and in perfect health.

"Her food consists of clover hay, crushed oats, green vegetables and fresh grass from which green clover is carefully excluded. She has browsed down nearly all the bushes that originally grew in her enclosure."[90]

Good Fellowship

Of all the animals treated in this work with the exception of the Plains Buffalo, the Muskox is the most gregarious.

Frank C. Hennessey, writing to Dr. J. A. Allen, says of the Muskox, which were abundant yet on Melville Island: "During the winter, the animals always herd. It is likely that some outcasts go about singly, but we saw not one of these. The smallest herd we saw during the winter was 4 and the largest 40."[91]

Throughout springtime, the various explorers have always found them in bands of both sexes.

Russell writes: "There are usually 20 or 30 in a band; but they sometimes assemble in herds containing over 100. . . . In one band of 11 which we killed, there were 8 males; in another, in which 25 were killed, there were only 2 females; and from this herd I shot 4 bulls which broke away from the Dogs together; all were of the largest size and evidently quite old."[92]

Similarly Dr. A. Fisher: Aug. 24th "we observed a herd of 7 Muskoxen at the foot of a hill, at the distance of about 2 miles from the beach. . . . We succeeded in getting one of them, which was a bull, and apparently the

[89]Rasmussen's Greenland, p. 298.
[90]N. Y. Zool. Soc. Bull., Sept., 1902, p. 34.
[91]Muskox Monog., p. 201.
[92]Far North, p. 233.

largest in the herd. Among those that got away there were 2 calves, and all the rest, with the exception of one, appeared to be cows. In the course of the evening, another Musk-bull was shot, which was found by itself, and therefore supposed not to be one of the herd just mentioned."[93]

During the early summer, as with so many bovines, there is a disposition to break up the herds. Especially do the bulls seem to go where they can think things over by themselves "far from the madding crowd."

"Towards the coming of summer," says Hennessey, "the herds always break up, and I noted the bulls wandering aimlessly about the sea coast. Between the time when the ice and snow had left the greater part of the land and the time of our departure, we saw at Windsor Harbour (Melville Island) only one cow, the rest being solitary bulls. This may have been an accidental occurrence, but it is certainly interesting, for it leads me to think that perhaps during the season of propagation the cows remain inland."[94]

This summer solitude of the bulls seems to be the only exception to their rule of habitual gregariousness. The only Muskox I ever saw wild was a solitary bull Aug. 16, 1907. He had wandered for 10 or 15 miles at least; and so far as I could learn from his tracks, was quite alone in the country.

The Harem

August is the mating season. Then there is a reuniting of the bands. So say many recorders, including Hearne. This sturdy old traveller continues:

"The number of bulls is very few in proportion to the cows; for it is rare to see more than 2 or 3 full-grown bulls with the largest herds; and from the number of the males that are found dead, the Indians are of the opinion that they kill each other in contending for the females. In the rutting season they are so jealous of the cows, that they run at either man or beast who offers to approach them; and have been observed to run and bellow even at ravens, and other large birds, which chanced to light near them."[95]

The solitary bulls at this season may be those that were defeated in the fight for mates; or possibly their cows had ceased to be interesting, and they were in search of new possibilities.

The spring of the year finds the Musk-cattle in bands of both sexes, as usual. It is not known whether or not the mothers go off alone to produce their young.

[93] Voy. Disc., pp. 257–58.
[94] Muskox Monog., p. 201.
[95] Journey, p. 136.

At Muskox Valley, Grant Land, Ellesmere Id., May 3d, Greely killed a cow Muskox nearly ready to deliver a calf.[96]

The Baby Muskox

According to Hearne, the young are born in "the latter end of May, or beginning of June; and they never have more than one at a time."[97]

The young one is a funny fuzzy little bump of black moss, like a magnified kid, tricked out in fluffy velours. According to some accounts, the little one is hidden by the mother in the moss, or the moss and snow; quite buried for one, two, or three days. She lingers near, and comes to nurse it at frequent intervals. Other travellers maintain that the young are able to follow the mother within an hour or two of birth, and are never left alone.

Analogy with the Plains Buffalo inclines one to accept the latter account. The growth of the young closely parallels that of the Plains Buffalo calf. Its mother is devoted and fearless in her care. And the frightened grunt or bleat of the calf is enough to rally the whole herd about it.

Of course, writers who tell about the herd in a perfect circle or a perfect square, with the calves in the middle, do not mean literally a circle or square. Impartially read, it would mean that the herd bunches, the calves get next the mothers, and the bulls face the enemy, and even advance on him, so that something like a definite formation is often achieved.

M'Dougall says, May 8, 1853: "During the afternoon, Mr. Dean returned with the carcases of the animals shot yesterday, also a young bull calf about 4 days old, which he had caught in the vicinity of the scene of yesterday's slaughter, when in all probability the mother had been shot. The little animal was about the size of a small lamb (height to foreshoulder, 19 inches; from nose to tail, 20 inches; weight, 25 lbs.), with a large head and prominent eyes. On its arrival on board, it could scarcely stand on its legs, but after partaking of a little warm milk, from a phial, the mouth being covered with chamois leather, it appeared to be thriving; and for a day or two, ran about the decks in such great glee as to induce us to hope we might be enabled to convey to England in safety this interesting specimen of an animal so little known as the Muskox. Unfortunately, however, its strength gradually decreased, and on the 4th or 5th day, it died."[98]

R. MacFarlane says that a Muskox calf which he "captured on the Barren Grounds east of Fort Anderson, in the summer of 1864, bellowed like

[96] 3 Years, p. 417.
[97] Journey, p. 136.
[98] Resolute, p. 244

a domestic calf, but with a stronger voice; and that in attacking its captors, it backed off, and butted like a ram."[99]

He further states that it gave endless trouble bucking and kicking like a Goat, stubbornly refusing to be led by a line.[100]

The story of Buffalo Jones's hunt after Muskox calves given in his "Adventures," affords vivid and intensely interesting picture of the ways and country of these untamable little woolbearers. Jones and his partner, Rae, had secured five lusty little calves, and meaning them for the nucleus of a Muskox ranch, brought them out nearly to the woods. But one sad morning, these two gallant explorers awoke to find the calves dead with their throats cut. The Indians believe that if one take out any live Muskox, all the rest will follow after them and be gone for ever. To prevent this calamity, they had sneaked in by night and killed the captives.

On Sept. 7, 1925, in the Bronx Zoological Park was born a baby Muskox, the first ever born in captivity in America. It stood 18 inches high at the shoulders, and weighed 16 pounds. On Sept. 14th, another arrived. Each lived but 4 days. Their mothers were $2\frac{1}{2}$ years old and had practically no milk. It is believed that next year, the calves will be saved.

The Grand Old Warrior

A herd of Muskox may stand at gaze, or run as fast as they can, when approached by men; but when approached by Dogs (or Wolves), they form a solid mass to face the enemy. This gives the riflemen a perfectly easy, unhazardous opportunity to shoot them all from a safe distance which method indeed, has been the established mode.

I do not know of any nobler spectacle in animal life than that of the ten-times trained and selected old King Bull of the harem, deliberately keeping himself between his many-wived household and its foes—marching around the frightened herd to reassure them of his absolute protection. Of his strength and power they are not in any doubt. Arctic explorers are little given to sentiment, and yet in their cold-blooded and carnivorous accounts, one cannot fail to find the under-note of admiration for this dauntless old warrior's valiant—usually hopeless—fight against irresistible odds and death.

The bull Wapiti, the bull Caribou, and the buck Whitetail are attached to their females only during the period of wild and propagational joy. At any other time, their wives can go hang, so far as the overlording husband is

[99]Preble, Athabaska-Mackenzie, p. 155.
[100]Mack. Basin, p. 171.

Bull Muskox
Horns: Length 30": width 13¼
Spread, 27. Coll.n E.W. Darbey

Plate, LXXXVIII.— Remarkable Muskox Head

concerned. In gladdening contrast to this is the demeanour of the Musk King-bull. Summer and winter, glad time or sad time, he is with the herd, and ready at all times to prove himself its fighting champion—its fearless and unselfish defender.

Lieut. George F. Mecham, of M'Dougall's party, when on Melville Island, wrote of the great herd of 70 head he saw at Hardy Bay in the early summer of 1820:

"On my approach, they divided into herds of about 15 each, headed by 2 or 3 enormous bulls. Their manœuvres were so quick and regular, that they were to be compared to squadrons of cavalry more than anything I could think of. One herd advanced several times at a gallop within rifle shot, and formed in perfect line, with bulls in front, showing a formidable front of horns. The last time they advanced at a gallop to about 60 yards, and formed in line, the bulls at the same time snorting and tearing up the snow.

"Immediately I fired they wheeled round, joined the main herd, and made off out of sight, only waiting occasionally for the wounded one."[101]

Frank Russell says: "I had an excellent opportunity to observe their behaviour on one occasion, when we approached within 30 yards of a dozen Muskox, held at bay by as many Dogs. They were in two groups about 20 feet apart, an old bull standing between them. They were not formed in a circle nor in two circles, but all turned toward any Dog which ventured too near, seldom lowering the head, but standing firmly, the head in line with the back. Two other herds, when pursued by the Dogs, scattered in all directions; they would run a few yards, then turn to dash at the Dogs as they closed in, repeating this performance until overtaken by the hunters to whom they fell an easy prey."[102]

Dr. John Richardson has described the behaviour of a herd that was approached by hunters without Dogs.

"On perceiving a herd of cows, under the presidency of an old bull, grazing quietly at a distance of a few miles from our bivouack, he [Dr. John Rae] and Albert crept toward them from its leeward; but the plain containing neither rock nor tree behind which they could shelter themselves, they were perceived by the bull before they could get within gunshot. The shaggy patriarch advanced before the cows, which threw themselves into a circular group, and, lowering his shot-proof forehead so as to cover his body, came slowly forward, stamping and pawing the ground with his fore feet, bellowing, and showing an evident disposition for fight, while he tainted the

[101] Resolute, p. 289.
[102] Far North, p. 235.

atmosphere with the strong musky odour of his body. Neither of the sportsmen were inclined to irritate their bold and formidable opponent by firing, as long as he offered no vital part to their aim; but, having screwed the bayonets to their fowling pieces, they advanced warily, relying on each other for support. The cows, in the meantime, beat a retreat, and the bull soon afterward turned; on which Mr. Rae fired, and hit him in the hind quarters. He instantly faced about, roared, struck the ground forcibly with his fore feet, and seemed to be hesitating whether to charge or not. Our sportsmen drew themselves up for the expected shock, and were by no means sorry when he again wheeled around, and was, in a few seconds, seen climbing a steep and snow-clad mountain-side, in the rear of his musky kine."[103]

What might have been the next chapter of this story is given by Dr. A. Fisher. Of course, the explorers needed meat, which justified whatever killing they did, and yet one must admire the bravery of the grand old leader—scorning to fly—fearlessly facing his foes to the end.

When first they saw the old bull, "he was going along the beach to the eastward; and, from the nature of the ground, was obliged to pass so close to us that he was fired at from the ship. We thought at first that he was wounded on this occasion; but we soon had reason to alter our opinion, for he galloped off at greater rate than an animal of his shape could be supposed capable of going. The nature of the ground was, however, as I have already remarked, very favourable for our purpose; for he was hemmed in by the sea on one side, and steep cliffs which he could not ascend, on the other. When he found, therefore, that he was assailed in such a way that there was no possibility for him to escape, he immediately put himself in a posture of defense by taking up a position in front of a large stone, where he could not certainly be attacked by any other animal, except under a great disadvantage; but to the means which we had, he could offer no resistance, and consequently fell."[104]

Capt. Sir. F. Leopold M'Clintock says: "I once came across a solitary old bull, which instantly faced me, spent a few seconds rubbing his horns against his fore legs (a sure sign that mischief is brewing), and rushed on me at full speed; but I had taken the precaution so to approach him that I was able to shoot him when he halted on the brink of the ravine, down which I had retreated."[105]

But new modes of destruction are invented without ceasing—though

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[103]Arctic Searching Expedition, 1851, I, pp. 323–24.

[104]Voy. Disc., p. 249.

[105]In MacFarlane's Mackenzie Basin, p. 174.

there is no offsetting armouring or multiplication of the animals. Commenting on the complete destructiveness of the established mode of rounding up with Dogs, and slaughtering from a safe distance, Stefansson says:

"This method was inferior to the one developed by Natkusiak's party at Cape Grassy. Natkusiak told me that it occurred to him one day to see how close he could get with safety, and that he got so close that he could touch the heads of the animals with the end of his rifle. If they charged, it would be one at a time, and he could always kill that one. He told me that the latter part of the summer, his party had scarcely ever been more than 10 yards away when shooting and commonly enough the powder would singe the hair. The animal stood with lowered head, and the bullet could be placed in the back of the neck just at the base of the horns, resulting in instant death and clean butchering.

"Occasionally, perhaps frightened by something else, a herd will run away on the first approach of danger. If they start running, they are more difficult to overtake than Caribou, which seldom run more than 8 miles. But commonly when Ovibos are alarmed, they will run to the top of the nearest small knoll and make a defensive formation spoken of as a circle or a square, although I have seen triangles and various irregular formations. Usually the big animals are on the outside with the calves in the centre. When there are 2, they will stand tail to tail, and when 3, they make a 3-pointed star. If danger is approaching from one side only, they may form in 2 or 3 lines with the biggest animals in the front rank and the smallest in the rear. Their central idea is one of defense, though they may charge upon occasion. Two animals may charge together, but I have never seen a whole band do so, nor have I heard of it. Usually they charge singly, each one making a short rush of from 10 to 15 yards, then whirling rapidly, running back to the herd facing about once more, and backing into line."[106]

His Way of Life

As I turn over the great masses of Muskox literature, I note without surprise but with weary regret, that nineteen-twentieths of it, at least, deals only with the slaughter of this picturesque old patriarch of the Polar Realm. So rarely is there anything about his way of life, that with little need of selection, I give all I can find. Hanbury's "Northland" is far more rewarding to the life-historian than anything else since Hearne. His opening picture of the Muskox Happyland is well worth reproducing:

"On the main Ark-i-linik [Thelon] River, there is a stretch of country about 80 miles in length into which no human being enters. The Eskimo

[106] Friendly Arctic, pp. 582–83.

PLATE LXXXIX.—MUSKOX STUDIES

Drawings by E. T. Seton, 1907

do not hunt so far west, and Yellow Knives and Dog-Ribs from Slave Lake do not go so far east. To penetrate this country in the dead of winter would be simply to court starvation. Then the Deer have all departed, and to depend on finding Muskoxen at the end of the journey would be risky indeed. Thus there still remains one spot in this Great Barren Northland which is sacred to the Muskox. Here the animals remain in their primeval state, exhibiting no fear, only curiosity. I approached several herds within 30 yards, photographed them at my leisure, moving them round as I wished, and then retired, leaving them still stupidly staring at me as if in wonder. When Deer were not procurable, a Muskox was killed."[107]

As he travelled down this beautiful Northern stream with its sunny spruce-dotted banks, he lived on Caribou meat, and was glad to come across another Muskox. It stared innocently at the traveller from the near shore; and he etc., etc.

"We took enough meat to last us several days and proceeded down the river, meeting the same day several more Muskoxen. One remained close to us while we were pitching the tent in the evening. As he did not appear disposed to move off, I took my camera and approached within 30 yards, when I snapshotted him. He remained feeding on the willows, so I went still nearer. He showed no sign of fear, but I did, for I carried no arms. I ascended a small knoll below which he was feeding, and thus got within a few yards of him and snapshotted him again. I then wished for another shot in another direction, so I threw a piece of rock at him, which only produced an angry shake of the head. I threw several other missiles, but he only stood, angrily shaking his head, pawing the ground, and making a low, guttural grunt. I took one more photo and then retreated, leaving him to finish his evening meal in peace. He remained near our camp all night."[108]

On another occasion Hanbury says: "Following the stream slowly down, and spying the ground most carefully for Deer, I brought my glass to bear on an object such as I had not seen for many months, an old Muskox bull. He was lying absolutely still on the bank of the stream, and it required a second look to assure me that it was really a Muskox, and not a low bunch of scrub spruce. With good cover and a steady wind, I had no difficulty whatever in making an approach. As we were badly in want of meat, I took no risks, but fired 8 bullets into him as fast as I could. Poor brute! He could not make out what was up. He kept turning round as

[107]Northland, p. 13.

[108]Northland, pp. 39–40.

each bullet struck him, until he finally toppled over dead. He was a very large bull and in splendid condition; in fact, he was the only really fat Muskox I have ever seen killed."[109]

In 1907, I was privileged to visit the west end of this, the chosen range of the Muskox. In the short, bright summer from mid-May to mid-September, it was a land of bounteous pastures, rich, deep grass—knee-high grass in every valley—flowers in luxuriant beds everywhere; and even the bleak hillsides and tops were patched and carpeted with creeping foliage, as well as moss.

This is the richest pasture region in the range of the Muskox. It is far richer than any pasture I ever saw on the Plains portion of the Buffalo range. It was more nearly comparable with the prairie lands of Iowa and Manitoba. When the sharp frosts of early October come, these grasses for the most part wither; but they do not go to pieces or blow away. There are no devastating prairie fires to blacken the land, and ruin its pensioners. November snows are deep, and the Long Night Moon comes after.

Starvation and deep snow are nearly synonymous terms with most wild creatures. But the Muskox is equipped for just such yearly stress. With a woolly coat of adequate thickness, and the whole country one enormous sheet of provender, packed safe away in cold storage, he is an admirable instance of the well-known fact that animals care little about temperature, if only they have abundance of food.

Even the Buffalo suffered in a blizzard; but the Muskox is equipped to meet any measure of cold and wind. Nevertheless, he does not seek for hardship.

"In the depths of winter," says Hennessey, "they were practically never seen on the level land about Winter Harbour; but when parties travelled to points where the country was rugged, they were found in the valleys, which parts they sought as protection from the blizzards."[110]

The Message

Hitherto, the great service rendered by the Muskox has been to feed Arctic explorers whose energy outran their discretion; so that they were starving to death far beyond the reach of white man's resources. But the growing scarcity of the Muskox, combined with the ever-increasing prudence of the explorer, as his job took him farther afield, has upset the old adjustment.

[109]Northland, pp. 224–5.
[110]Muskox Monog., p. 201.

So also, the sudden increased demand for the robes, and greater facilities for travel toward the land of the Muskox, have had a sinister influence. Finally, in the Kingdom of Ice, the introduction of rifles among the Eskimo threatens to send the Muskox the way of the Dodo. In a hundred years, we have seen the Muskox range shrink to half, and the numbers to probably a tenth of what they were in 1800.

Two mighty influences there are, however, which may yet save the species from extermination: Sentiment and commercial value.

It was sentiment, intangible, unreasoning, but enduring sentiment—not commercial value—that saved the Buffalo and the Antelope, as well as many birds, from total extinction; and we may well believe that this protecting shield can be successfully raised over the Muskox.

Already it has developed into concrete action. The Canadian Government has set apart Southampton Island (and maybe also Coates Island and Mansell), in the northern part of Hudson Bay as a sanctuary for Muskox. This Island comprises about 20,000 square miles of ideal range like that long inhabited by the Polar Cattle on the mainland farther west; not that Muskox were ever found on it, but obviously it has all the makings of a Muskox pasture. It is the intention of the Government to stock this island and make of it a sanctuary, with a force of energetic Mounted Police, who will not only guard it against poachers, but will extirpate all beasts of prey that are a menace to the herds. So that here, at least, the Muskox may live in peace and multiply indefinitely. Here, at last, is a sanctuary inviolate in which the species may be preserved as a beautiful and undying example of the laws that made all life.

Commerce, though more brutal, is the more powerful force. Should it prove feasible, as many maintain, to grow this creature for its robe, wool, and flesh, so that these may become staples in the markets of the big world, then are we quite sure to save the Muskox.

The first step in this direction would be the complete domestication of the species. Its marvellous adaptability is seen in the fact that Muskox have been successfully kept for years at Woburn Abbey, England, at the Berlin Zoo, the Washington Zoo, and Bronx Park, New York. It is reassuring that recently in the last they have even bred.

Greely and many other men of the North have advocated the domestication of the Muskox. Its robe is already prized in commerce. Its wool, although but half the quantity per animal, is equal in quality to that of a Sheep, and has the unusual merit of never shrinking. Its milk is more abundant than that of Reindeer, Sheep, or Goat, and richer than that of a

cow. The meat of one Muskox is as much as that of 3 Sheep, and as nutritious as beef. The musky flavour, Stefansson claims, can be overcome by judicious selection of time and season, and by careful methods of butchery. In summary he says: "When you add to this that the animal does not roam in search of pasture, that the bulls are less dangerous than the bulls of domestic Cattle because not inclined to charge, and that they defend themselves so successfully against packs of Wolves that the Wolves understand the situation and do not even try to attack, it appears that they combine practically every virtue of the Cow and the Sheep, and excel them at several points."[111]

It is, however, as a range beast for the great Northern prairies of Canada, rather than as a barnyard adjunct, that Stefansson is chiefly interested in the creature. The establishment of refuges by the alert Canadian Government opens the way for such a development; and it is quite possible that we may in the near future, realize the dream of many who love the Northland and its native animals, and see presented to the world a range beast that is indifferent to the fiercest polar winter, and unique in its fitness for the whole of the vast Northern plains.

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[111] Friendly Arctic, p. 587.

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The American Bison, Buffalo, or American Wild Ox

Bison bison (Linnæus)

(Gr. and L., *Bison*, the shaggy, hump-backed, wild Ox of Europe; the true Bison)

Bos bison Linnæus, 1758, Syst. Nat., ed. 10. Vol. 1, p. 72.
Bison bison Jordan, 1888, Man. Vert., U. S., ed. 5, p, 337.

Type Locality—Mexico

French Canadian, *le Bison.*
Cree & Ojibway, *Mush-kwe-tay Pej-ee-kee* (prairie horned-beast).
Chipewyan, *Ed-jer-ay.*
Sioux, *Tah-tank-kah* (bull); *Ptay* (Cow).

The genus *Bison* (H. Smith 1827) has, in addition to all the Family characters: Curved cylindrical horns; a high hump on the shoulders, due to great prolongation of the spines of the vertebræ; a short tail; long woolly hair, especially on the head and fore parts.

$$\text{Teeth: Inc. } \frac{0-0}{4-4}\text{; can. } \frac{0-0}{0-0}\text{; prem. } \frac{3-3}{3-3}\text{; mol. } \frac{3-3}{3-3} = 32$$

The American Buffalo, in addition to the Family and generic characteristics, has peculiarities of size and colour indicated by the following:

Size. A full grown bull, that is, in fifth or sixth year, is $5\frac{1}{2}$ to 6 ft. at the shoulder (1,673 to 1,825 mm.); total length, 10 to $12\frac{1}{2}$ ft. (3,042 to 3,803 mm.); tail, 20 to 36 in. (507 to 913 mm.); hind foot, 23 to 26 in. (584 to 661 mm.).

The beard is usually 8 to 10 in. long (203 to 254 mm.). E. Carter, of Breckenridge, Colo., tells me that the longest beard he ever measured was 12 in. (305 mm.). The ordinary process of grazing tends to keep the beard of wild individuals worn down short. I have no doubt that the length given is exceeded in zoo specimens.

The cows are somewhat smaller, being about 5 ft. at the shoulder (1,521 mm.); total length about 7 ft. (2,132 mm.); tail, 15 to 20 in. (381 to 508 mm.); hind foot, about 20 in. (508 mm.)

Head. It is customary to speak of the enormous head of the Buffalo as a thing out of proportion to his bulk; but the Buffalo head divested of its wool, is of the same proportion as that of the Horse, Ox, or Dog. That is to say, at the shoulder, the animal is $2\frac{1}{2}$ heads high; and the body from the shoulder point to the croup is about $2\frac{1}{2}$ heads in length.

Weight. About 1,800 pounds is considered average weight for a bull, but Charles W. Payne, of Wichita, Kansas, tells me that in 1898 he weighed two living bulls at 2,220 pounds and 2,000 pounds respectively.

According to Audubon and Bachman,[1] fat cows weigh about 1,200 pounds, though Henry says[2] seldom over 700 or 800 pounds. The lesser weight seems to be nearer the average, but I have seen cows that stood as high, and looked as heavy, as ordinary bulls.

The Wood Buffalo collected by Harry V. Radford in 1909, weighed 2,402 pounds.

Colour. The bull has the head, tail, legs, lower parts of neck, and shoulders dark brown, shaded into lighter brown on the upper parts of the body, palest on the shoulders and hump. Toward spring, all the upper parts of the body bleach into a dull brownish yellow, beside which the head looks black.

The cow is similar, but darker in the body colour.

At birth, the calf is dull reddish yellow, paler on the legs and under parts; at six months, it is more like the mother; at two years, it is everywhere of a deep, glossy, blackish brown; after this, it again grows paler with age.

There were several well-known freaks and colour-varieties of the Buffalo "robe," as the shaggy pelt of the animal was called. The "beaver robe" was a rich brown with very fine fur; of these, not more than one in ten thousand was found. The "black robe," oftenest seen in the Mountain Buffalo, was less rare. The "buckskin robe," of a yellow tinge, a sort of half albino, had little value. There were also the "blue robe," which was slaty, and the "white or pied robe." This last was the rarest.

The White Buffalo. One or two of these in a lifetime was the utmost that any hunter secured. The Indians treasured them as "great medicine." Long writes[3] of one which John Dougherty saw in an Indian hut, "a Bison head very well prepared, which had a white star on the front. The owner valued it highly, calling it his great medicine; he could not be tempted to part with it, 'for,' said he, 'the herds come every season into the vicinity to seek their white-faced companion.'"

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[1] Q. N. A., II, p. 44.
[2] Journal, I, p. 171.
[3] Exped., I, p. 471.

Horns and Record Heads

The longest horns recorded in Rowland Ward's book (Records of Big Game, 1922 ed., pp. 427–28) are from Wyoming, and are in the possession of Lord Rendlesham. They measure: Length, on outside of curve, 20⅞ in.; girth, 15 in.; widest inside, 30½ in.

Next to this is W. H. Root's head, measuring: Length, 20¼ in.; girth, 16⅛ in.; tip to tip, 33½ in.; followed by that of P. Liebinger taken in W. Montana: Length, 19 in.; girth, 12½ in. The last two are owner's measurements.

To these Ward adds 13 heads, whose horns are 14 in. long or over.

According to Montague Brown,[4] the largest recorded horns of this animal are 21 in. long with a girth of 15 in.; but August Gottschalk, of Boseman, Mont., has sent me statements, fully and legally attested, that he has a mounted head of which the left horn is 22 in. long, and 16⅜ in. in girth at the base, the widest spread of the horns being 35 in. from tip to tip. He sends me also a photograph of the head of a grand old bull having a spread of 33½ in. across the horns, the right having a length of 20¼ in. and a girth of 16⅛ in. I have not seen either of these.

The record cow head in Rowland Ward's book is owned by Col. Ralph Vivian. Length, 14 in.; girth, 7¼ in.; tip to tip, 12 in. It was taken in Wyoming.

Races

Covering, as it does, so many diverse faunal areas, one might naturally expect the Buffalo to split up into several corresponding races; and it is generally recognized that, in a measure, it did so.

The far North produced the huge Wood Buffalo; the Rockies, the small dark Mountain Buffalo; the Plains, the paler, medium-sized Plains Buffalo; the forests of the Eastern States, the Black Pennsylvanian Buffalo, now extinct.

The following races have been recognized:

bison Linnæus, the typical form. T. l., Mexico.

athabascæ Rhoads, a large and dark form. T. l., near Fort Resolution, Mackenzie, Canada.

pennsylvanicus Shoemaker, much like *athabascæ*, but apparently larger and blacker; many of the old bulls being coal-black with grizzly white hairs around the nose and eyes; little or no hump. T. l., Pennsylvania.

[4]Encyclopedia of Sport.

History

The Bison, or Buffalo, the largest and, at one time, the most important of all America's big game, was discovered by the explorers of the 16th Century.

In 1521, Cortez, the Spanish conqueror of Mexico, reached Montezuma's capital, the City of Mexico, where, in the menagerie, he saw the first American Bison to be viewed by European eyes. The menagerie and the beast are thus described by Antonio de Solis.[5]

"In a second courtyard of that House, one could see all the Beasts, which had been made presents to Montezuma, or which were taken by his Hunters. They kept the fierce ones, such as Lions, Tygres, Bears, and the other kinds which New Spain produces, in strong cages of wood, arranged in good order in a covered place. But nothing was more surprising than the sight of the Bull of Mexico, a rare composite of several and divers animals; taking from the Camel the hump upon the shoulders; from the Lion, the flank dry and drawn up; the tail tufted, and the neck furnished with a long fringe in the manner of a mane; and from the Bull, the horns and the feet cloven. Outside of which, it imitates the ferocity of the last, in the vigour and the lightness with which it attacks."

But this was at least three hundred miles from the natural range of the Bison, which, as a wild animal, had yet to be discovered. This discovery took place nine years later; and again the honour fell to a Spaniard. In 1530, Alvar Nuñez Cabeza de Vaca was wrecked on the Gulf Coast. Travelling inland to what is now southeastern Texas, he met with the Bison on its native range. So far as known, this was the first meeting of the wild American Buffalo and the gun-bearing white man. De Vaca's remarks are brief but clear:[6]

"Cattle come as far as this. I have seen them three times, and eaten of their meat. I think they are about the size of those in Spain. They have small horns like those of Morocco, and the hair long and flocky, like that of the Merino. Some are light brown (*pardillas*), and others black. To my judgment, the flesh is finer and sweeter than that of this country [Spain]. The Indians make blankets of those that are not full grown, and of the larger they make shoes and bucklers. They come as far as the sea coast of Florida [now Texas] and in a direction from the north, and range over a district of more than 400 leagues. In the whole extent of plain over

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[5]Histoire de la Conqueste du Mexique, III, 1691, p. 280.
[6]Davis's Spanish Conquest of New Mexico, 1869, p. 67.

PLATE XC.—A BUFFALO HERD IN THE EARLY FALL

(*Bison bison* (Linn.))

which they roam, the people, who live bordering upon it, descend and kill them for food; and thus a great many skins are scattered throughout the country."

Coronado was the next explorer who penetrated the region inhabited by the Buffalo, which he traversed from the west, entering by way of Arizona and New Mexico, in 1540. He crossed the southern part of the "Panhandle" of Texas, as far as the edge of what is now Oklahoma, and returned through the same region. It was in the year 1542 that he reached the Buffalo country, and crossed the plains that were "full of crooked-backed Oxen, as the mountain Serena in Spain is of Sheep." One of his followers, Castañeda, gives a description of the animal, and adds: "We were much surprised at sometimes meeting innumerable herds of bulls without a single cow, and other herds of cows without bulls."[7]

The earliest discovery of the Bison in Eastern North America, or indeed anywhere north of Coronado's route, was made in 1612 somewhere in Virginia by an Englishman, Sir Samuel Argoll, afterward Deputy Governor of Virginia, who says:[8]

"I set my men to the felling of Timber, for the building of a Frigat, which I had left half finished at Point Comfort, the 19th of March; and returned myself with the ship into Pembrook [Potomac] River, and so discovered to the head of it, which is about 65 leagues into the Land, and navigable for any ship. And then marching into the Countrie, I found great stores of Cattle as big as Kine, of which the Indians that were my guides, killed a couple, which we found to be very good and wholesome meat, and are very easy to be killed, in regard they are heavy, slow, and not so wild as other Beasts of the wilderness."

He anchored then on the Potomac at the head of navigation; in other words, within what is now the District of Columbia. Thus, the English first saw the Buffalo within the present capital of the United States. The Spaniards first saw it in the capital of Mexico.

From this time onward, the region of the Buffalo was more often visited; and the explorers gave frequent descriptions of the great beast and of its vast numbers.

The earliest portrait that I can find was that given by Gomara in 1553. It is here reproduced, full size. Evidently it was drawn from the imaginative description of the discoverer. While corresponding, line for line, with the text, which corresponds, line for line, with the animal, it presents, in the language of the times, a monstrous beast indeed. (Plate CI.)

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[7]Davis's Spanish Conquest of New Mexico, 1869, pp. 206–07.

[8]Purchas Pilgrimage, 1625, Vol. IV, p. 1765.

Range in General

The accompanying map, (No.VII) showing the original range of the Buffalo, has been compiled from charts by George Catlin, and Dr. J. A. Allen, and with later information accumulated from other sources; but especially from data supplied by the Biological Survey. Those who wish for fuller details of the Buffalo in Pennsylvania are referred to S. N. Rhoads's writings, and those of Col. H. W. Shoemaker. (See References.)

It is generally supposed that the City of Buffalo, N. Y., was named from a near-by salt-lick that was frequented by Buffalo in early days. The question is discussed in Miller's "Mammals of N. Y."[9]

The recent finding of a Buffalo skull at Syracuse is strong supporting evidence. F. J. H. Merrill tells me (May 5, 1900) that this was dug up near the corner of So. Salina and Croton streets, Syracuse, N. Y., in the spring of 1889. It was identified by E. D. Cope and Gerrit S. Miller, Jr. It is now in the Museum of Syracuse University.

Since the accompanying map was prepared, evidence of much wider extension has turned up. Thus, Glover M. Allen records, "the discovery of a fragment of the maxilla with 2 milk teeth of a Bison at Orleans, on Cape Cod, Mass."[10] The find was made by Dr. A. W. Grabau.

"In 1826," according to Vernon Bailey, "Peter Skene Ogden, in charge of a party of trappers, discovered Harney Lake, which he graphically describes in his journal entry of November 1st, and he says 'Buffalo have been here, and heads are to be seen.' This carries them fifty miles farther west than the Malheur Cave, and I believe gives the westernmost record for Buffalo in the United States.[11]

Marcus W. Lyon, Jr., announces the discovery of some Buffalo bones, horns, etc., from Upper Tularosa River, N. M. This extends the range of them nearly to the western border of New Mexico.[12]

Range in Manitoba

When Alexander Henry came to Red River, in 1799, he found the Buffalo swarming all along the Red River Valley.[13]

Alexander Ross says,[14] "All this part of the country was overrun by the wild Buffalo, even as late as 1810."

[9] 1899, pp. 298–99.
[10] Journ. Mamm., Aug., 1920, p. 162.
[11] Journ. Mamm., Nov., 1923, p. 254.
[12] Proc. U. S. Nat. Mus., 1906, p. 648.
[13] Journal in References.
[14] Red River, p. 15.

MAP VII.—RANGES OF THE WHITE GOAT AND THE AMERICAN BUFFALO

By E. T. Seton with help of the Biological Survey, and (for the Buffalo) reference to the maps of Dr. J. A. Allen and Dr. W. T. Hornaday.

Range of the White Goat in primitive times, and practically unchanged to-day, in solid black. It lies chiefly in British Columbia, but overlaps the primitive range of the Buffalo in Montana and Idaho.

Range of the American Buffalo in outline and heavy shading.

In 1812, the first brigade of Scotch families arrived to found Red River Colony. Strange to say, this was the first year when the Buffalo did not graze over the site of modern Winnipeg.

In 1817, Buffalo were "far off" from Red River.[15]

In 1818, according to tradition, a large band came for the last time within a day's ride of Fort Garry.

In 1819, they could still be found in the country adjacent to Fort Pembina.[16]

In 1821, Buffalo were scarce at Pembina.[17]

In 1826, Buffalo were not found within 150 or 200 miles of Pembina.[18]

In 1849, the hunters went 250 miles from Pembina in the direction of Cheyenne River before finding the Buffalo herds.[19]

In 1852, the end of the Buffalo was evidently not far distant.[20]

Nevertheless, there were, at that time, many Buffalo still roaming the Big Plain where Carberry now stands. Captain John Schott, of Athabaska Landing, tells me that in 1852 when he was a boy of eleven years, he went with a party of Buffalo hunters (Saint Pierre Pierrot, Louison Bonnot, and Pierre Bonnot) in search of Buffalo, westward of Winnipeg. They found plenty of them on the Big Plain, and camped in the sandhills to the south where there was a good place to herd the Horses, and also high hills from which to see the Buffalo. Little John's job was to watch the Horse herd from some sandhill; and if they strayed too far he would go on his pony to round them up. Old Baldy, the high, bare sandhill back of Jim Graham's place, is pointed out as the Buffalo lookout.

The more recent skulls that strewed the Big Plain in 1882, dated chiefly from that hunt of thirty years before.

In the winter of 1856–57, according to H. Y. Hind, the Buffalo were very numerous on the banks of the Souris.[21]

In 1858, Hind found abundance of fresh Buffalo sign along the International Boundary, near Souris River.[22] He saw no Buffalo there, but records that there were great herds of these animals still on the summer range of the Côteau du Missouri, 50 miles to the southwest.[23] The fear of the Sioux, he says, kept most hunters out of that country.

[15]Ross, Red River, p. 47.
[16]As above, p. 50.
[17]As above, p. 58.
[18]As above, p. 99.
[19]As above, p. 255.
[20]As above, p. 267.
[21]Ass. & Sask., p. 43.
[22]As above, pp. 44–45.
[23]As above, p. 46.

PLATE XCI.—BUFFALO HERD IN WINTER

Drawing made in 1892, by E. T. Seton

At Two Creeks, Hind saw and shot the first Buffalo—a bull—on July 9, 1858. Next morning, as he journeyed toward Fort Ellice, he saw 3 more. Thirty miles west of the Fort, he says, "Buffalo were numerous."[24]

The last Buffalo band seen in Manitoba by John Schott was in 1861, when an immense herd was discovered in Grand Valley. They completely covered the site of the present town of Brandon.

In 1867, a trader, J. L. Legare, went on a journey from Winnipeg toward Wood Mountain. He told me that he saw the first Buffalo at Oak Lake; and during the winter of 1867–68, he and his partner lived on Buffalo killed on the Souris Plains, although the animals were then scarce, and only small bunches were to be seen. The great herd kept farther west, about Cypress Hills.

In 1874, Dr. E. Coues passed along the International Boundary without seeing any Buffalo, till he got to Frenchman's River, Mont., about Long. 107° 20,′ or 200 miles west of Manitoba.[25]

In 1875, a few stragglers were said to be on the Big Plain.

Dr. F. W. Shaw, of Carberry, tells me that in 1879, about Nov. 7th, as he was going to Rapid City from the Big Plain, he saw the tracks of 3 Buffalo at a place about 4 miles north of Grand Valley. They had been seen by a Mr. McFadden, while they were crossing the Assiniboine.

In 1882, C. C. Helliwell, of Brandon, saw 8 in the Souris region.

In the fall of 1883, according to A. S. Barton, of Boissevain, an old Buffalo bull crossed the Souris Plain from the southeast, going northwesterly toward Plum Creek. It was pursued by the Gale brothers on the Antlers of the Souris, but was never overtaken. When last seen, it was going toward Moose Mountain.

About this time, an old bull—probably the same—was seen near the site of the present town of Souris. My informant, H. W. O. Boger, says he saw it in daylight at 300 yards, as it crossed his farm. It was trotting, and went off northwest. A number of the boys went after it, but never got it. This was the last seen in the region. It was recorded in all the current newspapers.

In 1882, when first I went to live in western Manitoba, the prairie everywhere was dotted with old Buffalo skulls. Many had horns on them, but none had hair. Their condition and local tradition agree in fixing 1860 to 1865 as the epoch when the last Buffalo were killed on the Big Plain.

In the long slough east of Carberry, I have found many Buffalo bones; and on Aug. 13, 1899, I found a complete Buffalo skeleton there. No

[24]Ass. & Sask., p. 46.

[25]Birds, 49th Parallel, U. S. Geol. Surv. Terr., 1878, Bull. 3, p. 547.

doubt, all the large bogs throughout Manitoba contain skeletons of Buffalo that have been mired and engulfed.

Haunts

Although the map gives so vast an area as the range of the Bison in days gone by, it is not to be supposed that the species was equally abundant in all parts. We know, in fact, that it was comparatively rare in most of the wooded country.

The true Buffalo range was that part of the region which was without trees, and yet was provided with water, as will be seen on comparing the Buffalo map with the Forest and Plains map of America, Map IX. We find that in the East, the Buffalo followed the deciduous forests, and appeared to avoid coniferous woods. A study of the conditions prepares me for a find of Buffalo bones on the north side of Lake Erie.

In all this wooded country, however, its numbers were small, the true home of the species being the open region of the great Mississippi River Valley, where the land was unforested and yet well watered. On this only, was it ever found in herds of millions.

Migrations

All observers agree that the Buffalo in great herds visited parts of the country where at other times they had been unknown; and they remained for a time until impelled to another change of residence. The questions arise: Were these regular movements up and down certain routes? Was the change made under stress of weather or famine, or both? In other words, was the Buffalo truly migratory?

To this question, Catlin gives an emphatic "No."

"These animals," he writes,[26] "are, truly speaking, gregarious but not migratory—they graze in immense and almost incredible numbers at times, and roam about and over vast tracts of country, from East to West, and from West to East, as often as from North to South."

There is, furthermore, abundant proof that the herds were found summer and winter over most of the animal's natural range. This is all the evidence I can find for the non-migratory theory.

On the other hand, all records, even those of Catlin, refer to the coming and going of the Buffalo, as not perfectly regular, but quite seasonal; while most records speak especially of summer and winter ranges, as regions where herds were to be found at set times.

[26] N. Am. Ind., 1866, I, p. 248.

Col. R. I. Dodge tells[27] of "an immense herd on their journey north"; "one mass of Buffalo moving slowly to the northward," that he saw on the Arkansas in May, 1871.

At Beaver Creek, 100 miles south of Glendive, James McNaney says[28] that the Buffalo began to arrive *from the north* in the middle of Oct., 1882; that about the first of December, an immense herd came; that by Christmas, all had *gone southward;* but that a few days later, another great herd came *from the north* and *followed* the rest.

The half-breeds and old hunters along the Red River have often told me of the northward coming of the Buffalo in spring, and of their southward migration in the fall.

Colonel R. I. Dodge's many valuable observations on the migratory habits of the southern Buffaloes tend to the same conclusions:

"Early in spring," he says,[29] "as soon as the dry and apparently desert prairie had begun to change its coat of dingy brown to one of palest green, the horizon would begin to be dotted with Buffalo, single or in groups of two or three, forerunners of the coming herd.

"Thicker and thicker and in larger groups they come, until by the time the grass is well up, the whole vast landscape appears a mass of Buffalo, some individuals feeding, others standing, others lying down, but the herd moving slowly, moving constantly to the northward. . . . Some years, as in 1871, the Buffalo appeared to move northward in one immense column, oftentimes from 20 to 50 miles in width, and of unknown depth from front to rear. Other years the northward journey was made in several parallel columns, moving at the same rate, and with their numerous flankers covering a width of a hundred or more miles.

"The line of march of this great spring migration was not always the same, though it was confined within certain limits. I am informed by old frontiersmen that it has not within twenty-five years crossed the Arkansas River east of Great Bend, northwest of Big Sand Creek. The most favoured routes crossed the Arkansas at the mouth of Walnut Creek, Pawnee Fork, Mulberry Creek, the Cimarron Crossing, and Big Sand Creek.

"As the great herd proceeds northward, it is constantly depleted, numbers wandering off to the right and left, until finally it is scattered in small herds far and wide over the vast feeding grounds, where they pass the summer.

"When the food in one locality fails they go to another, and towards

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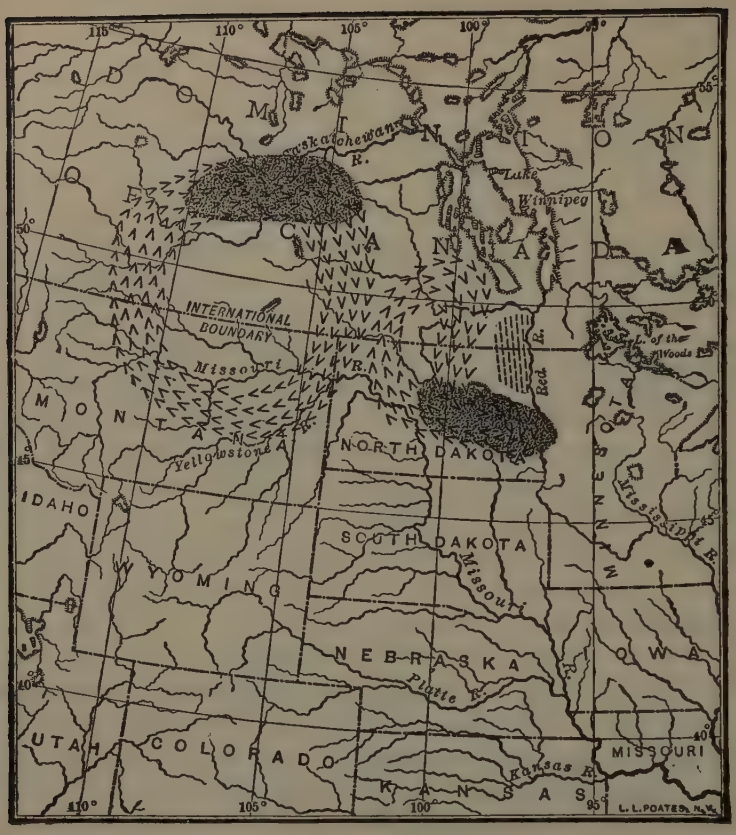
[27] Hunting Grounds, p. 120.

[28] Hornaday's Ext. Am. Bison, p. 421.

[29] Our Wild Indians, pp. 283–86.



MAP VIII.—BUFFALO MIGRATIONS

The dark area in each case marks the winter range. The arrowheads show direction of migration. Their ancient route along Red River is marked with straight dotted lines.

This illustrates the local nature of Buffalo migration. The Saskatchewan herd and the Red River herd kept apart, and followed each their own route. In the early years of the 19th Century, the Red River herd went north by the Souris and the Qu'appelle valleys, and came south along the Red River. But in 1820, on account of the growing Selkirk settlement, they abandoned the Red River, and went south by the Pembina Hills route. It is believed that the whole Buffalo range was occupied by similar herds with like migrations.

fall, when the grass of the high prairie becomes parched up by heat and drought, they gradually work their way back to the South, concentrating on the rich pastures of Texas and the Indian Territory, whence, the same instinct acting on all, they are ready to start together on the northward march as soon as spring starts the grass."

Hind, the leader of the famous exploring expedition to the Canadian Northwest in 1859, has left some valuable records[30] as to the Buffalo movements on which chiefly I have founded the accompanying map. It is remarkable that the Saskatchewan herd should have wintered in its coldest region. Probably the explanation is that this happened to comprise the best feeding grounds.

Alex. Henry's record given below shows that, in 1800, the stream of migration both northward and southward, moved parallel with and close to the Red River. The change to the route near Turtle Mountain began about 1812, when the first settlers came to Lord Selkirk's land grant; it was directly caused by the increase of hunters in the neighbourhood.

There is only one sure way to determine the question of migration. That is by a series of observations made during a number of years at one point where the Buffalo abounded. Twenty years ago, we should have said, "Too late for that," but now the discovery of Alexander Henry's precious old "Journal in Red River Valley" has shed some light on the Buffalo and most other bygone creatures of that now famous land of grain.

Henry's observations were made at Park River Post, a fort which he built on the Red River at a point 35 miles south of the International Boundary. The Buffalo lived in that region the year round, though less numerous there than higher up the river. I have collected all his remarks on their migration:

September 18, 1800. "The plain was covered [with Buffalo] on the W. side of the river as far as the eye could reach. They were moving southward slowly."[31]

November 7th. "Great herd of cows going at full speed southward."[32]

January 1, 1801. "Buffalo in great abundance. . . . The plains were entirely covered; all were moving in a body from north to south."[33]

January 14. "The river was covered with Buffalo moving northward."[34]

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[30] Ass. & Sask., p. 106.
[31] Journal, p. 99.
[32] As above, p. 136.
[33] As above, p. 162.
[34] As above, p. 167.

January 15. "The plains were still covered with Buffalo moving slowly northward."[35]

During January, 1803, he found the country from Park River to Riding Mountain crowded with Buffalo.[36]

November 15, 1805. "Terrible snow storm, Buffalo passing northward in as great numbers as ever I saw them."[37]

Three of these being northward movements in winter seems to contradict the idea of regular migration; but the writer expressly says that the last was during a blizzard; and presumably the others were in some sort of storm, as he speaks of 15 inches of snow. In Manitoba, blizzards come always from a northerly point. The Buffalo always faced the storm; hence, perhaps, this irregular movement.

I conclude that the Buffalo did migrate from 300 to 400 miles northward in spring, and as far southward again in autumn; but that the regularity of this movement was often much obscured by temporary changes of direction to meet changes of weather, to visit well-known pastures, to seek good crossings of rivers or mountains, or to avoid hostile camps, and places of evil memories. Furthermore, there were scattered individuals to be found in all parts of the range at all seasons.

Theoretically, the Buffalo must have been migratory. Although it covered a vast region, it continued of one species; whereas, it would probably have split up into several distinct species had it not been continually mixed as a result of migrations.

Ancient Numbers

The early explorers who describe the Buffalo bands do not give us anything more exact than superlative expressions, such as "countless herds," "incredible numbers," "teeming myriads," "the world one robe," etc.

To gain a more precise idea as to the numbers of this species, it is necessary to attempt an estimate, as follows:

The total area inhabited by the Buffalo was about 3,000,000 square miles. Of this area, open plains constituted about one half. According to figures supplied me by A. F. Potter, of the Forest Service, the ranges of North and South Dakota, Montana, Wyoming, Nebraska, Kansas, Colorado, Texas, and Oklahoma (a total of about 750,000 square miles, or half of the Plains) carried at the time of the last census (1900) about 24,000,000 head of Cattle and Horses, and about 6,000,000 head of Sheep. This means

[35] Journal, p. 167.
[36] As above, p. 208.
[37] As above, p. 273.

that, when fully stocked, these Plains might sustain a number of Buffalo at least equal to the number of Cattle and Horses. But the Buffalo had to divide their heritage with numerous herds of Mustang, Antelope, and Wapiti.

On the other hand, a Buffalo could find a living where a range animal would starve. Moreover, many of the richest bottom lands are now fenced in; and we have taken no account of the 6,000,000 Sheep. On the whole, it seems that we are safe in placing the number of Buffalo formerly living on the entire Plains area as about 40,000,000.

The range of the species on the prairies was a third as large as that on the Plains, but it was vastly more fertile; indeed, the stockmen reckon one acre of prairie as equal in fertility to four acres of the Plains. Doubtless, therefore, the prairies sustained nearly as many head as the Plains; we may safely set their population at 30,000,000.

The forest region of the Buffalo area supported a relatively sparse population. For its 1,000,000 square miles, we cannot allow more than 5,000,000 Buffalo.

Summing up these totals, we arrive at the conclusion that the primitive number of Buffalo was about 75,000,000.

Let us consider the question from another standpoint: There were 1,500,000 square miles of the Plains; it takes 30 acres of such range to support an ordinary range beast, which needs as much as, or more than, a Buffalo. There were as many of the latter as the food could sustain; therefore, the Plains had 30,000,000. But take off one third to allow for the herds of other creatures, and we have 20,000,000 as the number of the Plains Buffalo. On the prairies and in the woods, 10 acres a head is the usual range allowance; but doubling this to allow for Deer, etc., it would give us a population of 45,000,000, or a total of 65,000,000 Buffalo.

Again: Col. C. J. Jones estimated[38] the Buffalo in 1870 at 14,000,000. They were then occupying less than one third of their range, and were not nearly so crowded as in ancient times; their original total, therefore, must have been at least 50,000,000.

Yet again: All the evidence available goes to show that the Buffalo herds travelled from 100 to 400 miles in search of food; and that these herds broke up speedily to find sustenance; and, therefore, that the herds never went more than 300 or 400 miles from their home region.

Col. R. I. Dodge describes a northward-moving herd that was at least 25 miles across, and extended north and south as far as the eye could see.

[38]Forty Years, p. 255.

Since it was all day in passing, it was at least 20 miles deep. When so massed, Buffalo run frequently 25 to the acre. But halving that for moderation, we have a herd of at least 4,000,000. This was on the Arkansas in May, 1871.[39]

If this herd had been gathered from the extreme limits from which they are known to congregate, it would represent an area of 200,000 square miles. There would be room enough to repeat this about 15 times on their range, and thus yield a population of about 60,000,000 as the sum of the Buffalo in primitive days, when their whole range was stocked as fully as the food supply would permit.

From these facts, it will appear very safe to put the primitive Buffalo population at not less than 60,000,000.

The Dwindle

In 1800, there were practically no Buffalo east of the Mississippi. Their range had shrunk by one eighth, their numbers doubtless in even greater degree; 40,000,000 head would be a fair estimate at that time.

The Duke of Bedford's herd of Buffalo at Woburn Abbey, England, was begun in 1896 with 7 animals, and had increased to 25 in 1905, notwithstanding a loss of 11 by deaths. That is to say, it has increased 20 per cent. each year, and in six years had doubled.

A similar rate of increase is seen in the Corbin herd. However these figures represent an abnormal rate of increase, as the animals are constantly protected, and never suffer for lack of food.

The total of Buffalo in captivity in 1889 was 256; since then, they have added about 10 per cent. per annum in spite of many disadvantages, such as isolated animals, overfeeding, overproduction of males, etc. If, therefore, we set the annual rate of increase in the wild herds at 5 per cent., as long as they are within the limit set by food supply, we shall probably be near the facts.

In early days, the Buffalo held their own well against the Indians with their primitive weapons. But, in the full splendour of the Buffalo days, say about 1830, the Indians, aided now by Horses and armed with rifles, killed, as will be seen, more than 2,000,000 each year. Allen estimated that in 1845 "probably 2,000,000 a year is much less than half the number killed at this time by the Indian alone."[40]

In 1852, Baird assembled many pertinent facts and figures; then, to be conservative, divided the latter by 3, and says: "We shall still have

[39]Hunting Grounds, p. 120.

[40]History Bison, p. 562.

an annual aggregate of nearly 3,500,000 as the number [of Buffalo] destroyed by the upper Missouri tribes alone."[41]

Other means of destruction added at least half as many more to the number; so that 3,000,000 a year may easily have been reached as a total of loss in the '30's. To stand such a drain, with their slow rate of increase, the herds would have had to be at least ten times as numerous as they were. But they could not stand it, and they were plainly diminishing. Therefore, they must have fallen below 40,000,000 even as early as the beginning of the 19th Century. Nevertheless, they could not have been much less than that, or they would have vanished far faster than they did.

The Pennsylvania Buffalo

This Buffalo appears to have been much like the Wood Buffalo, but larger and darker—almost black. Although the first race seen by English-speaking folk, it was the last to be described. Col. Henry W. Shoemaker gave it the name "*pennsylvanicus*" in 1915, in his valuable "Pennsylvania Bison Hunt" (pp. 16–17).

It is hard to realize now that the woods of Pennsylvania contained thousands of Buffalo as late as 1750. Their pathways through the woods were the most convenient ways of travel for mankind.

As late as 1773, when Philip Quigley settled on the West Branch, Clinton Co., Pa., the great Northern herd of Buffalo "still numbered about 12,000 animals."

These facts are fully set forth in the above pamphlet by Col. Shoemaker; also in "Extinct Pennsylvania Animals," Part II, 1919, by the same author.

He writes me under date of Oct. 27, 1925, as follows:

"As to the Buffaloes in Pennsylvania, the last one in Somerset County was killed by Joseph Shank in the Glades of that county in 1810, according to George W. Grove, a noted local historian of Somerset County; and another one was killed in Northumberland County by Frederick Stamm in 1810. The hide of the Northumberland County Buffalo figured in a sale at Boalsburg, Centre County, in 1917, according to Mr. John W. Hess of Boalsburg, who stated that the hide had been in the possession of the Stamm family since the animal was killed. This hide was purchased by a representative of Col. Theodore Davis, not knowing its historical significance, for $19, and is now in his home in Boalsburg.

"The last Buffalo was driven out of Buffalo Valley, Union County, in the direction of Lewistown by Jacob Weikert in 1808. Col. John Kelly

[41] Pat. Off. Rep. Agri., 1851–52, Pt. II, p. 125.

killed a Buffalo at the Buffalo Cross Roads in Buffalo Valley in 1801; and the last herd of Buffaloes was wiped out in the White Mountains of Union County in 1799."

The Pennsylvania Buffalo is practically unrepresented in any museum. The young naturalist can do good service by watching excavations that are in progress anywhere in Pennsylvania, and especially in bogs. For in these we are likely to find skulls, bones, and even complete skeletons of this most interesting species.

The Wainwright Herd

In 1873, a Pend d'Oreille Indian named (Sam) Walking Coyote, captured 4 Buffalo calves, and brought them into the Flathead country of northwest Montana. In 1882 or 1883, they had increased to 14, and were bought by Michel Pablo and Charles Allard, half-breeds, who lived on the Flathead Reservation.

In 1893, Allard and Pablo bought the remnant of Buffalo Jones's herd at Omaha—some 26, not counting 18 hybrids or Cattalo.

Meanwhile, the authorities at Ottawa had determined to develop a herd of their own. Their small beginning is thus recounted by Commissioner Harkin:

"The first consignment of Buffalo received in Canada as the nucleus of the present herd came from the Good Night Ranch, Texas, in 1897. This allotment consisted of 2 two-year-old females and 1 three-year-old bull, the gift of T. J. Blackstock, Toronto, and was placed at Banff."[42]

During this time, Allard and Pablo had carefully guarded their herd. In 1902, it had increased to 220, not counting 57 sold to various zoos, etc., or 65 hybrids.[43]

In 1906, the free range was rapidly disappearing. At that time, the United States Government decided to open the Flathead Reservation for settlement. This forced Pablo and Allard to sell the herd. The Government offered a rather low price, which the half-breeds scornfully refused. Before the officials returned with a better offer, the Canadian Government, in 1907, secured the lot at $245 per head, f.o.b., Edmonton, Alta., on the understanding that they should receive not less than 500 Buffalo.

Pablo and Allard duly set about their wild task of catching and delivering the herd. The most desperate old Buffalo hunter in the crowd was more than satisfied with the excitement furnished. When the transfer was complete, the half-breeds had delivered 672 head of Buffalo; and reported

[42]Personal letter, April 28, 1926.

[43]M. J. Elrod, Recreation, June, 1902, p. 445.

MAP IX.—FOREST, PLAINS, AND PRAIRIES OF NORTH AMERICA (EXCLUSIVE OF MEXICO)

After C. S. Sargent's Map No. 1, Tenth Census of United States, Dep. Int., 1880, with corrections in Canada from the Atlas recently published by the Department of the Interior of Canada (1906)

Showing coniferous forest in dark tint, deciduous forest in pale tint, prairies in dotted tint, and treeless plains in white tint

that about 150—the wildest and toughest old bulls—were still at liberty, defying all attempts to drive them, rope them, or run them down.

These, with 117 secured from other sources, were safely planted in Buffalo Park, which comprises 162 square miles of rough, rolling range at Wainwright, Alta.

The exact details have been supplied by Commissioner J. B. Harkin, of the Canadian National Parks Branch, Dept. of Interior, Canada, as follows:

"A total of 672 head in all were obtained. This comprised the entire Pablo herd with the exception of a few outlaws it was found impossible to round up for delivery with the final shipment. Shipments and distribution were made as follows:

1st shipment to Elk Island Park	June, 1907	199 head
2nd " " " " "	Oct., 1907	211 "
3rd shipment to Buffalo Park	June, 1909	177 "
4th " " " "	Oct., 1909	25 "
5th " " " "	June, 1910	46 "
6th " " " "	May, 1911	7 "
7th " " " "	June, 1912	7 "
Total number shipped.....		672 "

"Subsequently in June, 1909, 325 head of these Buffalo, then in Elk Island Park, were transferred to Buffalo National Park, Wainwright, Alberta. At the same time, 77 head were transferred from Banff National Park to Buffalo National Park.

"In addition to the purchase of the Pablo herd, the Department purchased 30 head from the Conrad estate at Kalispell, Montana, paying $250 per head, crated, f.o.b. point of shipment.

1st shipment to Buffalo Park	Nov., 1910	15 head
2nd " " " "	Mar., 1911	15 "
Number of Conrad Buffalo.....		30 "

This implantation of 702 Buffalo increased rapidly, so that at the end of March, 1921, they numbered 4,609, with a prospective increase each year of 1,200 to 1,500.

Now the Government was in a predicament; for, even with artificial feeding in winter, 5,000 was the utmost that the Park could support. The fact that it contained also 419 Mule-deer, 155 Elk, 23 Moose, 4 Antelope, 15 Cattalo, 5 Yak, and 16 Cattle, which were steadily increasing, added to the complication. In brief, the range could sustain no more. It was not

PLATE XCII.—LEADING THE BUFFALO INTO THE POUND

PLATE XCIII.—HEAD OF BUFFALO COW
By E. T. Seton

possible to add to the Park, for all about it are prosperous farms. So, henceforth, there would be a surplus of at least 1,500 Buffalo each year to dispose of.

A few hundred were absorbed by other Parks or by zoos all over the world, at good prices. But that market was soon glutted.

"During the winter of 1922–23, 264 of the older surplus Buffalo bulls were killed as an experiment. In view of the continued large increase in the herd and the consequent shortage of pasture, it was decided to carry out slaughtering operations on a larger scale during the winter of 1923–24, when the animals were in good flesh and the fur prime. The total number of Buffalo slaughtered in these two operations was 2,145, of which 94 per cent. were males. This is about three times the number of the herd originally brought into the park."[44]

But many objections were made to this plan; "the Government was going into the Cattle business," etc.

It then occurred to the officials who had so successfully managed the wild life of Canada, that although they could not accommodate the annual increase by adding to the Park in the adjoining territory, they had at their disposal a 10,000 square mile tract in the Wood Buffalo Park recently created (1922). To this, they proposed to send the annual surplus, and turn them loose.

As soon as their plan was known, a storm of protest from many scientists broke about the Dominion officials. These onlookers maintained that the Wood Buffalo was a rare, interesting, and valuable species, and the introduction of Plains Buffalo in such numbers would virtually and unnecessarily wipe out the Wood Buffalo form.

To this, the Northwest Territory Branch of the Department made reply: In the Wood Buffalo Park are two quite distinct herds, in widely separate parts of the country. That in the north is the pure Wood Buffalo —if there is such a thing. That in the south, is halfway between the Wood and the Plains Buffalo. It is to the latter that the surplus of Wainwright is to be added. Furthermore, if the protesting scientists agree in disapproving this plan, let them propose another that is more satisfactory and yet practical.

To this challenge, no reply has been made. So that in 1924, the Northwest Territories and Yukon Branch of the Department demonstrated the wisdom and practicability of the scheme by safely shifting, per rail and scow, 1,634 Buffalo from Wainwright to the Peace River end of the Buffalo Park; where, with the trifling loss of 8, they joined the herds of their kinsmen.

[44]Comm. J. B. Harkin.

It is proposed to continue these importations until the south part of the Wood Buffalo Park is so completely stocked that its herds can be turned to economic account.

In summary, therefore, let us keep in view the following facts: The Wood Buffalo Park is 10,500 square miles, equal to the States of Massachusetts and Rhode Island together; the actual wild country adjoining is at least equal to the combined areas of North and South Dakota; in this, the actual surplus will soon be 5,000 Buffalo per annum. This surplus the Department of the Interior at Ottawa is wisely conserving and administering as a food and sport supply that will also yield a handsome revenue.

Thus, we cannot but applaud the wisdom of the Canadian Government that has been quick to profit by the error of her big sister in the south, and to save for judicious administration the remnant of the Buffalo.

Since the above was written, I learn from Director O. S. Finnie, that in the late fall and early winter of 1925, some 400 head of Buffalo wandered southward out of the Park boundaries, and wintered in the Baril and Clair Lakes districts, a low-lying country with abundance of hay. They continued sleek and fat all winter, and in the spring returned northward across the Peace River, and are once more in the original Park.

As it is possible that this migration may take place yearly, the Government is adding this new region to the Park. It will increase the area from 10,500 to 17,000 square miles. In this, the Buffalo will be protected and, no doubt, thrive and multiply.

Wiping Out the Plains Buffalo

At the beginning of the 17th Century, as we have seen, the Buffalo range covered some 3,000,000 square miles reaching from the Atlantic Ocean to Oregon, and from Great Slave Lake to the Gulf of Mexico. Their numbers were not less than 50,000,000 at this time.

About the beginning of the 19th Century, the Buffalo were cleared out of all the country east of the Mississippi.

In 1832, according to Catlin,[45] 150,000 to 200,000 robes were marketed each year; which meant a slaughter of 2,000,000, or perhaps 3,000,000 Buffalo by the Indians. The destruction was already so great that Catlin prophesied the extinction of the Buffalo "within *eight* or *ten* years." The drain was obviously more than the natural increase, and already the vast herds were shrinking visibly. About 1834 or 1835, they began to diminish very rapidly on the western slope of the Rockies, as Fremont records.

[45] N. A. Ind., I, p. 263.

But the eastern slope was the great Buffalo range. Concerning these two areas, this famous explorer writes:[46] "The extraordinary abundance of the Buffalo on the east side of the Rocky Mountains, and their extraordinary diminution, will be made clearly evident from the following statement: At any time between the years 1824 and 1836 a traveller might start from any given point south or north in the Rocky Mountain range, journeying by the most direct route to the Missouri River, and during the whole distance his road would be always among large bands of Buffalo, which would never be out of his view until he arrived almost within sight of the abodes of civilization.

"At this time [1842] the Buffalo occupy but a very limited space, principally along the eastern base of the Rocky Mountains, sometimes extending at their southern extremity to a considerable distance into the Plains between the Platte and Arkansas rivers, and along the eastern frontier of New Mexico, as far south as Texas."

Fremont reckoned the annual market of Buffalo robes as 90,000.[47] But robes were collected only during the four winter months; not more than a third of those killed at this season were skinned, while half of the robes were used at home, and never sent to market. Therefore, 90,000 robes represented a slaughter of about 1,920,000 Buffalo. But the rate of killing was so much higher in summer, that we may calculate the annual kill at 2,000,000 or 2,500,000 during these palmy Buffalo days. The Buffalo Indians had been decreased by the smallpox; but the white consumers more than made up the shortage. Naturally, therefore, the herds shrank fast.

In 1842, Fremont found distress among the Indians along the Platte on account of failure of the Buffalo.[48] In 1852, the Buffalo were so far from the Red River country (Manitoba), that Ross considered hunting them a thing of the past.[49]

In 1867, the Union Pacific Railway reached Cheyenne, penetrating the heart of the Buffalo country. It carried unnumbered destroyers with it, and split the remaining Buffalo herd in two. Thenceforth, it was customary to speak of the "south herd" and the "north herd," each of which appeared to recognize a boundary in those sinister lines of steel.

In 1868, William F. Cody undertook to supply meat to the construction gangs of the Kansas Pacific Railroad. He says: "It was at this time that the title 'Buffalo Bill' was conferred on me by the railroad hands. . . .

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[46]Expl. Exped., 1845, pp. 144–45.
[47]As above, p. 145.
[48]As above, p. 145.
[49]Red River, p. 267.

"During my engagement as hunter for the Company, which covered a period of 18 months, I killed 4,280 Buffaloes, and had many exciting adventures with Indians."[50]

On a wager with another Buffalo hunter, Cody killed 69 in one day, near Sheridan, Kans., in 1868; his rival, Billy Comstock killed 46.[51]

In this autobiography of 328 pages, he mentions seeing Antelope but once, Elk twice, and no other animals, except, of course Buffaloes.

Slaughter of the South Herd

In 1871, the Santa Fe Railway crossed Kansas, the favourite summer ground of the southern herd, now reduced to about 6,000,000 according to Buffalo Jones.[52] Then began the great slaughter by the white skin-hunters.

Doctor Allen says "the total killed between 1870 and 1875 cannot have been less than about 2,500,000 annually."[53] At first these came chiefly from the southern herd, which was virtually wiped out in 1875.

A few scattered bands lingered in out-of-the-way places, but were relentlessly hunted down. The last considerable herd that I can learn about was in 1886, described to me seven years afterward by Charles Norris, cowboy, of Clayton, N. M., whose narrative is full of interesting detail. The date seemed to me very late for so large a herd, but cross-examination did not make him change it.

The Last of the South Herd

The last big bunch of Buffalo he ever saw was in the "Panhandle" of Texas. He came on them in May of 1886. He was driving some Horses from Coldwater to Buffalo Springs; and, when 35 miles east of Buffalo Springs, he saw the herd about 3 miles off; and knew at once they were Buffalo, because they were all of one colour.

Next day, on returning, Norris saw the Buffalo again about 15 miles farther east, and rode in among them. Some were lying down, and some were grazing. They seemed about 200 in number; only 6 were little calves. As soon as they saw him, they bunched like Cattle and kept "milling" around. Then one bull made a lead to stampede; but none followed him, so he came back to the bunch. Another bull then started from the bunch, and tried to lead off. He ran about 100 yards, but he also returned.

Then one in the bunch that seemed a third larger than any other,

[50]Buff. Bill's Own Story, 1920, p. 118.
[51]As above, p. 125.
[52]Forty Years, p. 255.
[53]History Bison, p. 566.

Series of Buffalo horns

Redrawn from "Extermination of the American Bison," by W. T. Hornaday

Freak horn from Saskatchewan

In collection of James Hargraves, of Medicine Hat

Freak Buffalo horn found on the Black Plateau

Collected in 1895 by Frank H. Mayer

Drawn from photograph in *Outdoor Life*

PLATE XCIV.—BUFFALO HORNS, NORMAL AND ABNORMAL

"lit out"; and all following him, strung out in a semicircle. Norris tried to cut across to the middle of it; but instead of running away, part of them hung back, and it seemed as if they were going to surround him. He thought it wiser to fall back and get out of the ring. Then they strung off after the big leader.

Norris galloped behind, trying to rope a calf, but the mother turned on him. He had no gun, and his Horse was tired, so he gave it up. He noticed that in running, they "pawed" for a time with one side low; then changed to the other. After they went off, he rode on 15 miles southeast to camp.

A. N. Cranmer was in charge of the camp, which was by a small lake. He said: "This is the only water in the region, and they will be certain to come in here before three days." So the men waited; and on the second day, the whole herd appeared. Now they had a good chance to count them. There were 186. Here the men killed a cow and a bull.

They then set about roping some calves. Norris caught one, and Cranmer caught two. They had to kill the mother of the last, as she showed fight. The herd went off, and these men saw no more of it. One of the calves died, and Norris gave his to Cranmer's little boy, who sold it to Charles Goodnight of Clarendon, Texas. The other was traded to a passing stranger from Kansas for a span of colts.

In the November of the same year, on the same trail, Norris saw 12 head of Buffalo, but has never seen one since.

The very last individuals that I have knowledge of, were found in 1889. The account of them I got from William Allen, cowboy, also of Clayton, N. M., four years after the event. I give it in full.

About Aug. 20th, while out with a party hunting Mustangs, in the Neutral Strip, about 12 miles northeast of Buffalo Springs, the riders saw 4 animals, which they supposed were Mustangs, as they were rolling in the dust. They were about 3 miles away, on the south side of a little knoll. The hunters rode around on the north side, and got within 75 yards, to learn that these were 4 Buffalo.

The Buffalo took alarm at once, and started off westward, closely pursued by the hunters for about 3 miles. Here they met a man driving a bunch of Mustangs. The two bunches, Mustangs and Buffalo, joined. The men chased them for 2 miles, when they parted; the Mustangs turning to the left, keeping up the X I T fence, and the Buffalo going to the right. Allen chased these about 5 miles farther, and right into two of his own party. The Buffalo circled from them south and west 3 miles back, then right back to the X I T fence again. He fired four shots into a cow.

She quit the bunch, and went 2 miles to a lake, while he chased the three right through the X I T fence, and left them.

The men then returned to the cow at the lake; she ran into the deepest water, and stood at bay. After resting a short time, she came out of the water, and they shot her. A photographer, who was with the camp, took the pictures of the party with the skin and meat in view. That was the last Buffalo that Allen ever saw. He learned that the three were killed later on.

The North Herd

The great northern herd was still in existence, after the southern was wiped out. A colder winter, and the presence of hostile Indians, were the chief deterrents of the white skin-hunters.

Buffalo Jones offers the following table of Buffalo numbers.[54] Other writers have thought him too conservative in his estimates. In this, he does not discriminate between the two herds, which were about equal in numbers. It is well, therefore, to remember that after 1873, the south herd was gone, and the north herd numbered between 1,500,000 and 2,000,000.

Year	*No. of Buffalo*	*No. Killed Past Year*
1865	15,000,000	1,000,000
1870	14,000,000	1,600,000
1871	12,400,000	4,500,000
1872	7,500,000	4,000,000
1873	2,500,000	1,000,000
1874	1,500,000	500,000
1875	1,000,000	300,000
1876	700,000	100,000
1877	600,000	75,000
1878	525,000	70,000
1879	455,000	60,000
1880	395,000	70,000
1881	325,000	80,000
1882	245,000	85,000
1883	160,000	90,000
1884	70,000	50,000
1885	20,000	15,000
1886	5,000	4,000
1887	1,000	500
1888	500	350
1889	150	150

[54] Forty Years, p. 255.

Indians and North Herd

Valuable historic light on Buffalo, Indian, and white man is furnished by the Missionary, Father A. McG. Beede, in an article on the Buffalo Days. He writes:

"They say that from the year 1864 onward till after the Sitting Bull-Custer battle they—the Western Sioux Indians—kept the Buffalo herded back into Montana or the extreme western part of the present North Dakota. This statement, strange as it may seem, is confirmed by numerous white frontiersmen. . . .

"Old Indians say, and other evidence shows, that these Sioux Indians extended their herd line as far north only as the Kill-deer Mountains—never called Killdeer Mountains by the Sioux—and to the point on the Missouri River just north of these mountains. Meanwhile, the Buffalo, now quite safe from ruthless depredation by white men, increased greatly in numbers; and in the summer of 1875, many of these Buffalo crossed the Missouri from the south side to the north side—from the present McKenzie County to the present Williams County and Mountrail County—and thus escaping the Indian herd line, they roamed up and down the Missouri, often swimming the river forth and back, and going as far down the river as Painted Woods, 60 miles up river from Bismarck, N. D.

"All white frontiersmen know well that from 1864 onward till after the Sitting Bull-Custer battle, no Buffalo were to be found on the vast plains west of the Missouri River and east of this Indian herd line, except a very few that occasionally slipped through the herd line and were not followed by Indians and killed for food. But from 1875 on, large numbers of Buffalo were sometimes found in the north country which was beyond this Indian herd line, and some of them wandered as far east as the Turtle Mountains country.

"The Buffalo herds that crossed the Missouri in the late summer of 1879 or 1880, and those that drifted east from Montana after the Custer fight, mingled together in the territory west of the Missouri River, and for three years after 1879 there were so many Buffalo in that country that only a few thoughtful men supposed that the time should ever come when Buffalo hides could not be had in plenty.

. . . . . .

"After the Sitting Bull-Custer battle, which was the end of this careful attention given to the Buffalo by the Western Sioux Indians, the Buffalo that had thus increased in numbers came freely eastward, and seemed, at times, almost to fill the plains country west of the Missouri River in North

PLATE XCV.—LIFE STUDIES BY E. T. SETON

1. Study of an old cow. 2. Young cow. 3. Buffalo cow (Jardin des Plantes, March 25, 1892) 4. Old cow

PLATE XCVI.—BUFFALO BULL TEARING UP THE GROUND

The first act in wallowing

From a photograph by R. L. Walker, of Carnegie, Pennsylvania

Dakota. In old times, Indians never ruthlessly slaughtered Buffalo, or other animals. They used what was necessary and preserved the rest. The Buffalo were the Indians' Cattle.

"The Western Sioux Indians regarded Buffalo stealing about as a Dakota cattle-rancher regards Cattle stealing—as a crime deserving death. This Buffalo stealing by white men in the Dakotas was many times more the cause of trouble with the Sioux than all the gold in the Black Hills. I know this from hearing old Indians freely talk among themselves. That the trouble was chiefly caused by the Black Hills gold is an erroneous notion of the matter originated by white men. This notion has become fixed in written history, but it is incorrect."[55]

The Finish of the North Herd

In 1876, the United States troops pacified or drove the hostile Indians out of the Missouri country, opening the way for the skin-hunters. In 1878, the last great herd went south from the Saskatchewan, and the few scattered bands left behind were killed off by the Indians in 1879. In 1880, the North Pacific Railway opened a way into the central country of the last herd, and the southern story was repeated with even greater rapidity.

When first I went West, in 1882, there were skulls aplenty on every open plain, but the Buffalo were reduced to a few thousands,—certainly less than half a million. In 1885, there was no considerable northern herd in the United States.

The remnant, numbering perhaps 200 or 300, was scattered in droves among the Badlands between the Missouri and the Yellowstone. One of these bands, numbering 40 or 50, took refuge in the rough country along the Big Porcupine River, where 28 of them were killed in 1886 by an expedition to secure, at this the last moment, a series of specimens for the National Museum.

The rest of those in the United States, were soon picked off by cowboys and hunters.

The Remnants in Canada

But a few small bands lingered on the Upper Saskatchewan for several years.

James M. Macoun tells me that in early July, 1888, he saw the meat of 8 Buffalo bulls that were killed between Methy Portage and Lac la Biche. They were the last seen there.

In 1889, according to the Reverend J. A. McLaughlin, missionary of Victoria, north of the Saskatchewan, and Wm. L. Hine, the taxidermist of

[55] In the Days of the Buffalo, by A. McG. Beede, Forest & Stream, June, 1921, p. 248.

Winnipeg, a band of 11 was found in Hand Hills, 500 miles west of Manitoba. Five were killed by Indian acquaintances of McLaughlin. He saw part of the spoils, including a head, which sold at Winnipeg for $120. The other 6 were not accounted for.

The only wild Buffalo now left are those preserved in the Yellowstone Park, and the herd of Wood Buffalo that finds a refuge in the woods and on the Plains of Great Slave River.

Census

How many Buffalo, both wild and domesticated, all told, are now living? This is a question put by all who are interested in the subject. For a clear expression of their numbers, their decline, and the rescue of the survivors, I shall set the various figures in column:

Estimate of the Buffalo in primitive days	60,000,000
Estimate of the Buffalo in 1800	40,000,000
Estimate of the Buffalo in 1850	20,000,000
Col. C. J. Jones's estimate, 1870	14,000,000
Miller Christy's census* (of which 200 were in captivity) 1888	1,300
About 1895 they probably reached a minimum of	800
Mark Sullivan's census† in 1900	1,024
S. P. Langley's census,‡ Feb. 6, 1902	1,394
Dr. Frank Baker's census,§ 1903	1,753
Dr. Frank Baker's census,¶ 1905	1,697
American Bison Society Census (An. Rep.) 1908	1,917
" " " " " " 1910	2,108
" " " " " " 1911	2,760
" " " " " " 1912	2,907
" " " " " " 1913	3,453
" " " " " " 1914	3,788
" " " " " " 1916	5,592
" " " " " " 1918	6,466
" " " " " " 1920	8,473
" " " " " " 1921	9,311
" " " " " " 1923	12,457
" " " " " " 1924	14,369

*"The Last of the Buffaloes," London Field, Nov. 10, 1888, p. 697.

†"The Buffalo Still Lives," Boston Evening Transcript, Oct. 10, 1900.

‡Am. Bison in U. S. and Canada, U. S. Dept. Int., 57th Congress, 1st Sess., Senate Doc. No. 445, pp. 38–39.

§Stat. Am. Bison, 1905, Nat. Zool. Park, Smithsonian Institution.

¶Stat. Am. Bison, 1906, Nat. Zool. Park, Smithsonian Institution.

For Jan. 1, 1924, the Bison Society offers the following details:

Numbers To-day

Summary of Bison Census for Jan. 1, 1924

Captive in U. S.	4,167
Wild in U. S.	125
Captive in Canada	8,877
Wild in Canada	1,200
Captive in North America	13,044
Wild in North America	1,325
Total pure-blood Bison in North America	14,369
Captive in South America and foreign countries	76
Total pure-blood Bison throughout the world	14,445
Calves born in 1923, included in the above total	2,491

Summary of United States Government Herds (9 in all)

Montana National Bison Range, Montana	560
National Zoological Park, Washington, D. C.	16
Niobrara Reservation, Nebraska	46
Pisgah National Forest & Game Preserve, North Carolina	3
Platt National Park, Oklahoma	3
Sully's Hill National Park, North Dakota	13
Wichita National Forest & Game Preserve, Oklahoma	147
Wind Cave National Park, South Dakota	106
Yellowstone National Park, Wyoming	758
Total number of Bison in U. S. Government Herds	1,652
Calves born in 1923, included in above total	266

With over 14,000 Buffalo at the beginning of 1924, adding 20 per cent. per annum to their number, it is easy to believe that we have now, in 1926, over 20,000 of the American Buffalo still alive,—abundance for all present needs.

Domestication

The pure-blooded Buffalo has not proven a success as a domestic animal Its obstinate and often ferocious temper remains unchanged by contact with man. The cows when with the calves, and the bulls at all times are of a fierce, combative disposition. One never knows when this may break out.

A number of men have been killed by tame Buffalo; and those who know them best, trust them least.

During various times, in setting forth these Lives, I have proclaimed with emphasis that such and such a wild creature is absolutely harmless to man—Wolf, Cougar, Bear, etc.; let them alone and they will not harm you. I might, indeed, make the same sweeping statement for all of those herein treated. However, I must now frankly admit a notable exception: that is the Buffalo. At all times and places, the Buffalo, male and female, old and young, are savage, treacherous animals; always a menace to man and beast; never to be trusted. The Buffalo is a dangerous animal, the only really dangerous one in America. If we had exact figures to show, I believe we should find more human beings killed by Buffalo than by any other of our wild creatures.

So far as I can learn, the earliest systematic effort to domesticate the Buffalo took place in Manitoba. In 1877, some Indians returning to Winnipeg from the West brought with them 5 Buffalo calves (1 bull and 4 heifers). These became the property of James McKay (Tonka Jim), and were allowed to run about the outskirts of the town until 1882. Then the herd, numbering 23, came into the possession of Warden Sam L. Bedson, by whose courtesy I was enabled to examine the herd at Stony Mountain, and gather full information.

The account, which I partly reproduce, appeared in the May, 1886, edition of my "Mammals of Manitoba" as well as in the *Manitoba Free Press*, May 28, 1886.

The Bedson Herd

At the present time (Jan., 1885) the herd numbers 41; of these, 6 are half-breeds with the common Cattle; 6 are three-quarter bred; and the rest pure Buffalo. The object of domesticating these beasts is to provide an animal better suited to the requirements of the Northwest than the common animal, which is, of course, unable to bear the winter without a certain amount of housing and feeding.

These Buffalo receive no care beyond what is necessary to prevent their wandering away or being stolen. They live on the open prairie summer and winter, subsisting on the wild grass, even when they have to dig for it through one or more feet of snow. Nor is it a bare existence that they so maintain; for when I saw them late in January, they were finding grass enough, not merely to feed, but to fatten them. When a blizzard comes on, they lie down close together with their backs to the wind, and allow the snow to drift over them; so that under the combined protection

of the snow and their own woolly coats, they are perfectly comfortable. In Jan., 1884, one of the cows calved on the open prairie and though at the time the thermometer registered 38 degrees below zero, neither cow nor calf appeared to suffer the slightest inconvenience.

In 1888 this herd had increased to 58, not counting 25 half-breeds. In November of the same year, they were bought by Colonel C. J. Jones (Buffalo Jones), of Kansas, and added to the 57 already in his possession.

From these, at least in part, have been supplied most of the herds now in captivity.

Cattalo and Yakalo

At present, experiments are being made with hybrids between Buffalo and more docile breeds of Cattle.

Buffalo (Col. C. J.) Jones has made many investigations along this line, and believes in a hybrid form between the Buffalo and Common Cattle. This "Cattalo," as he calls it, is especially suited as a range animal for the Far North. It has the advantages of being exceedingly hardy, fearless of blizzards, able to paw and root through the snow for grass when ordinary Cattle would starve. Above all, it produces a robe which is very superior even to that of a Buffalo—worth, indeed, as much as an entire ordinary steer. However, the continued interfertility of the hybrids has not yet been proven, and is, indeed, much questioned by geneticists.

Alaska and Canada are the countries for which these experiments have a special interest.

The Canadian Government, through its Bureau of Wild Life, is experimenting now with Yak and Buffalo hybrids. His Grace the Duke of Bedford, in 1908, presented to the Canadian Government a herd of 6 Yak. These and their descendants have been kept at Banff, and at Wainwright chiefly. They now (1921) number 26, not counting half a dozen donated to other zoos.

This hybrid, or "Yakalo," has all the advantages of the Cattalo, and is even better equipped to find its own living in a land of frost and snow.

The Buffalo Wool Fiasco

The Red River was the scene of another attempt to turn the Buffalo to commercial account.

In 1822, there was founded at Fort Garry a joint stock company called the "Buffalo Wool Company."[56]

[56]Ross, Red River, pp. 69–72.

The partners proposed to gather the Buffalo wool and use it as a substitute for that of the Sheep. Undoubtedly, the wool in question would make a good, serviceable cloth; but the difficulty of getting the raw material in quantity and, above all, the mad mismanagement of the enterprise, ended the scheme in a disastrous collapse.

Ross informs us[57] that a yard of the cloth fetching 4s. 6d [$1.08] in England, cost £2 10s. [$12] to make on Red River.

Flies and Wallows

As the summer grows warm, the Buffalo shed their coats in great, broad flakes or wads of mothy-looking felt, till the hinder half of their bodies becomes positively nude. And now the mosquito millions are turned loose. I suppose that even a Rhinoceros would be annoyed by these long-beaked stingers of the lush, wet prairies; and the Buffalo, with their naked rears, are driven to accept any promise of relief. Standing on a high knoll in a strong wind is said to be "good medicine" against the flies. But such a combination is not always available; and, besides, it precludes feeding. A much more convenient protection is found in a supplementary coat of mud.

Catlin's description of the Buffalo habit of "doping for flies" is old, but worthy of repetition; for he saw it in its highest development, and on numberless occasions:

"In the heat of summer," he says,[58] "these huge animals, which, no doubt, suffer very much with the great profusion of their long and shaggy hair or fur, often graze on the low grounds in the prairies, where there is a little stagnant water lying amongst the grass; and the ground underneath, being saturated with it, is soft, into which the enormous bull, lowered down upon one knee, will plunge his horns, and at last his head, driving up the earth, and soon making an excavation in the ground, into which the water filters from amongst the grass, forming for him in a few moments a cool and comfortable bath, into which he plunges like a Hog in his mire.

"In this *delectable* laver, he throws himself flat upon his side, and forcing himself violently around, with his horns and his huge hump on his shoulders, presented to the sides, he ploughs up the ground by his rotary motion, sinking himself deeper and deeper in the ground, continually enlarging his pool, in which he at length becomes nearly immersed. And the water and mud about him mixed into a complete mortar, which changes his colour,

[57] Ross, Red River, p. 72.

[58] N. A. Ind., I, pp. 249–50.

and drips in streams from every part of him as he rises up upon his feet, a hideous monster of mud and ugliness, too frightful and too eccentric to be described."

This practice seems to have been much more popular with the bulls than with the cows—a fact which seems to prove that the flies alone were not the cause of it. The bulls were more heavily clad with wool on the fore parts, and therefore, suffered more from the heat. Also they gathered more of the prickly seeds that are an active irritant of the skin.

Chief among these plants on the northern Plains is the "spear grass" or "wild oat" (*Stipa spartea*). In July, it seeds abundantly. Each seed is like an oat, with a sharp corkscrew point and a long barley awn; but set everywhere with fine bristles pointing backward. When this contrivance touches the wool of a Buffalo, its barbs at once cling; and by a complete hygroscopic mechanism, first carefully studied by Miller Christy,[59] it revolves seven or eight times in an hour, boring through the wool and finally reaching the skin.

Every prairie man remembers the sharp prick of the speargrass. First its corkscrew penetrates his clothing; then it attacks his person. Every sheep-owner, too, can testify that it keeps on boring, even through the skin; till an angry, irritating sore is produced. This aggressive plant was, no doubt, one of the plagues that drove the Buffalo to the wallows. A proof of this, as Christy points out, is seen in the fact, that the old wallows are rimmed about with an unusually thick and vigorous growth of spear-grass. The newer generation calls them "fairy rings."

Rubbing Posts

The wallow was not the only offset to the skin-tickling. Rubbing places were in great demand. It is well known that the posts of all the first telegraph-lines across the Plains were thrown down, again and again, by the Buffalo rubbing against them. Even when the poles were protected by sharp spikes, the big brutes were not deterred from utilizing these delightfully convenient scratching posts. They were, indeed, attracted, rather than repelled, by the additional tang thus given. Further, as every settler on the Plains of the Souris knows, the boulders there are smooth, and have a hollow worn around them, by the scrubbing and trampling of Buffalo for generations, availing themselves of the chance for a vigorous rub. There are some famous examples of this on the top of Pilot Mount, Manitoba. Old travellers along the Red River tell of all the trees being rubbed

[59] On the Power of Penetrating the Bodies of Animals Possessed by the Seed of *Stipa spartea*. Read before the Linnæan Society, London, Feb. 21, 1884.

smooth, like those in a farmyard. There is, indeed, little doubt that the Buffalo have helped to extend the prairies, and to reduce the woodland country by rubbing down the trees.

Buffalo Chips

The Buffalo's sanitation is of the crudest type; its excretions are left anywhere. Such is the rule among creatures that have nothing of the nature of a nest or home place.

Those of us who knew the Buffalo in the old days, recall the essential service rendered by the Buffalo chips, or dried, flat cakes of Buffalo dung. These are primarily finely ground-up grass and herbage, glued together with juices of digestion into solid cakes, that speedily dry out and furnish excellent fuel—the only fuel known on the Plains. Wherever trader, trapper, or hunter bivouacked, all were dependent on Buffalo chips for the comfort of fire. As these benevolent contributions kept their shape for years, they abounded on all of the Buffalo range. Cattle chips and Horse chips are possible fuel, and much used; but for some unknown reason, were far inferior to the Buffalo chips, which give a hot, clear, steady, and nearly smokeless fire.

Diseases

The old Montana trader and Buffalo hunter, Charles Aubrey, writes: "Except scab, I have never seen any diseases among the Buffalo. At times, the young Buffalo as well as the old bulls were thus affected; but the disease was not deep-seated like the form of scab in Cattle; still I have seen cows die from scab."

In the vast herds, some forms of lameness were at times noticed in individuals, due to their hoofs being deformed by injury to the young in the crush of a wild stampede, such as I have known them to make at night in the winter, when they might go over a cut bank on to the ice of a river, when many were killed by piling on top of each other.

"My old Indian friend, The-Horn, told me that once on a trip to war against the Crows—being out of meat—they ran Buffalo. Behind the herd, were found two young cows so exhausted that they could not move when approached. "They were sick, the skin being very hot and cracked all over. Only at long intervals had he seen Buffalo in that condition; and then but few of them.

"When butchering Buffalo at the end of the chase, I have frequently examined their lungs, but never found any symptoms of tuberculosis or other affection of the lungs.

PLATE XCVII.—A VERY HIGH-HUMPED OLD BULL

PLATE XCVIII.—THE OLD BULL'S LAST FIGHT

Drawings by E. T. Seton

"I killed a young bull in good flesh which had a large abscess on the liver; and two young cows, both fat, in same condition. Another had badly affected kidneys."[60]

Enemies

The chief natural enemies of the Buffalo herds, taken in inverse order of importance, were insects, blizzards, Wolves, prairie fires, bogs, the Indian, and rivers. Epidemic disease, as already noted, seems to have been unknown among them.

Insect plagues meant less to the Buffalo than to most of the ruminants. Their thick wool and tough hides, reinforced by a coat of mud, rendered them nearly indifferent to the attacks of mosquitoes; and so far as known, the warble, the gad-fly, and the nose-fly did not pester them.

A suggestive sidelight is furnished by the following incident. A town boy and a country boy of my acquaintance in Scotland, were suddenly confronted by a herd of wild, Highland Cattle. The boys were on foot; and the Cattle, evidently excited and hostile, came towards the boys, led by the bull. At first, the herd walked; then came running towards the strangers. There was no tree or cliff near by. There seemed no chance of escape from death. But the Highland boy was wise. He stopped, faced the bull, and began a low, sharp buzzing—a good imitation of a hornet; he increased and varied it. After a moment's hesitation, the wild Cattle turned and fled over the moor.

The Blizzard

Hitherto, the blizzard has been entirely ignored as a destroyer of Bison. My attention was first called to it by Romanzo N. Bunn, of Chicago. He brings forward evidence to show that the last great herd inhabiting the country north of the region between Yankton and Devil's Lake, and between the Big Sioux River and the Missouri, was destroyed by the blizzard of 1871–72. He states that in the '70's, hundreds of thousands of Buffalo crossed the Missouri River, going northward; and that they had never returned, nor were they accounted for by the hunters. Senator D. L. Pettigrew, of Flandreau, Dak., informed him that after the terrible winter of 1871–72, he found herds of Buffalo lying dead in the hollows, evidently buried where they had sought shelter.

Concerning his own experiences, Bunn writes me:

"After months spent in prospecting throughout the Northwest during 1880, I reached a point a few miles to the westward of the Big Sioux River, and settled upon government lands in Kingsbury County, present State

[60] Forest & Stream, July 25, 1908, p. 133.

of South Dakota. There I noted with astonishment the enormous number of Buffalo skeletons lying bleaching upon the prairies. The adult skeletons were, at that time, in a perfect state of preservation, showing, for the most part, no signs of having been disturbed since the death of the animal. Reasoning that, if they had been killed by hunters, I should find broken limbs, skulls with bullet-holes in them, and marks of rifle-balls on the bones, I searched often and diligently for these signs, but I found none. True, a stray shoulder-blade, older in appearance than the rest, had a spear-head sticking through it, as evidence that an Indian had killed this animal many years before; but, on the newer-looking and complete skeletons, no mark of violence was to be observed.

"Evidently, they had not been killed by hunters. They lay stretched out on the prairie, large animals and small, on upland and lowland; usually singly, though one day I found fifty in a bunch, lying in a ravine. These seemed mainly small or young animals. I observed that just to the north, was one of the highest hills in the locality, the situation being such that, within an hour after a big blizzard had gotten up full steam, this ravine would probably be ten feet deep with snow.

"I pondered much upon this subject, for there were at least 200 of these skeletons on my own half-section. By the time the next season opened, however, I had ceased to wonder how they died, for the cause became evident.

"The winter of 1880–81 is still known to the early settlers of Dakota as the 'blizzard winter,' and the storm of October 15, 1880, as the 'October blizzard.' The morning of that day, following a rainy night, opened with a fast-falling snowstorm and a gale from the north. You could not see a house twenty feet away. To venture from shelter during the next two days was to endanger your life. Although early in the season and the temperature not very low, the soft, wet snow would weigh down your clothing in a few moments, so you could scarcely bear the burden. When it cleared, on the morning of the 17th, the entire aspect of the landscape seemed changed. The prairie at this point is quite rolling, and cut by many dry water-courses; although there is not a living stream in the country, and not a tree in sight. On that morning, the whole country had been brought to practically a dead level. The quantity of snow was almost beyond belief. Everywhere, it entirely hid the prairie grass, lying a foot deep even on the highest ridges. Wide ravines, 20 feet deep, were full to the top; and these held much snow as late as the following May.

"Cattle belonging to various settlers had drifted away during the storm and, in spite of the fact that it was early in the season and the Cattle in good

condition, many were lost, For example, a pair of heavy, strong work-oxen had passed over the brow of a hill, and were standing on their feet in the drift, dead. Their backs were on a level with the surface of the snow, their noses elevated in an effort to prevent smothering, the large horns disclosing their location.

"In such a blizzard, no escape was possible for even the hardy Buffalo. They would have been buried in the sheltering hollows where they sought repose, and would there have shared the fate of the old oxen. Large clusters of bones found in such spots indicate that this had indeed happened—that their deadliest enemy was the snow.

"To repeat, the great herds that went north in 1870–71, never returned. There is no evidence that any large numbers of them were killed by hunters, red or white; and there is, therefore, but one reasonable explanation of their disappearance. They were exterminated by the blizzards of 1870.

"Further, I believe that, at all times, the Dakota blizzard has taken heavier toll of the Buffalo than ever the Dakota Indian did."

The Silver Storm

Another deadly climatic visitation is fully described by G. B. Grinnell. He says: "The winter of the beginning of the year 1856 was the severest ever known by the Cheyenne Indians. Its hardships are still well remembered, and every old man and old woman can recall that terrible season. For a long time, the whole prairie was covered with ice, and the Buffalo and Wild Horses could not travel on it, but fell down and could not regain their footing. . . .

"The Indians had plenty to eat from the Buffalo that they killed; but the Horses, having nothing to eat, slowly starved; and before the party got back to the village, every Horse had died."[61]

During this winter, there can be little doubt that most of the Buffalo and Antelope were wiped out in the region scourged by the storm. It is not known just how far it extended; but it probably covered most of southeastern Wyoming.

Commenting on a similar condition on the Saskatchewan in 1810, Alexander Henry writes: "April 18, 1810. He [Mr. Rocque] saw upward of 60 dead Buffalo. At this season, many are so weak that if they lie down they cannot rise."[62]

No one who has seen the northern blizzard will question its terrible power. I have lived through several; and agree with Bunn that a winter

[61] Winter War Stories, Forest & Stream, March 5, 1910, p. 369.

[62] Journal, p. 594.

with a long succession of these snow-typhoons might, in certain circumstances, destroy every Bison on the range.

No one who has seen an ice or silver storm on the Plains, can doubt that it is a more fearful visitation than a plague. It means death to all prairie creatures that are non-hibernant, and dependent on grass.

But blizzards *did not happen every winter*, and they were restricted to a certain limited treeless area lying far north and in which the snowfall was heavy. Silver storms were rare, for they had to begin in rain, and end in fierce frost. So that I doubt whether, upon the whole, the destruction by weather stress was comparable with that by other agencies which were of more regular and more general occurrence on the Buffalo range.

The Grim Gray Wolf

Every Buffalo band was followed by Wolves that picked off the young, the weak, and the wounded; and thus kept the herds up to a good physical standard. But on the whole, the reduction by Wolves was not great.

The fitness of the Buffalo to combat this enemy is illustrated in the following incident which had taken place at Wainwright Park, in June, 1914, a few days before my arrival.

Three mounted men, under direction of the Warden, were trying to corral a Buffalo cow that was to be shipped. The poor success of their efforts provoked the ridicule of a visitor who, accompanied by a fine collie, was looking on.

"My Dog is worth more than the lot of you for a job like that," he exploded in scorn.

"Can your Dog handle a Buffalo?" asked the Warden.

"Can he? He has handled hundreds of Cattle and many big bulls. He could run that Buffalo into the corral all alone, and in three minutes."

"What will you bet?"

"Fifty dollars. Here it is!"

The money was covered. The Warden ordered the riders to stand back. The Cattle drover shouted to his Dog: "Here, Shep! put her in! Sic her! That one, there!"

Away went the keen and intelligent Dog, without a moment's hesitation; dashing, as he had done a thousand times successfully, at the rear, and nipped the heel of the Buffalo cow. By all the rules, she should have sprung forward and away from the Dog. But, in the words of the Warden: "She spun around on a ten-cent piece," and with one swift blow of her mighty foot, she smashed that Dog to earth. He lay a flattened corpse.

Tears came into the drover's eyes. "I don't mind the money," he said,

"but I wouldn't have taken $500 for that Dog; he was the best in the world."

"Now," said the Warden, "you see that a Buffalo is a very different creature from a common cow."

The Buffalo were trained on Wolves.

The Plains Ablaze—Buffalo Blinded

Prairie fires not only destroyed the food of the Buffalo, but were the source of direct danger to the animal, as we realize in reading this extract from Henry's "Journal":[63]

"November 25, 1804. Plains burned in every direction, and blind Buffalo seen every moment wandering about. The poor beasts have all the hair singed off; even the skin in many places is shrivelled up and terribly burned, and their eyes are swollen and closed fast. It was really pitiful to see them staggering about, sometimes running afoul of a large stone, at other times tumbling down hill and falling into creeks, not yet frozen over. In one spot we found a whole herd lying dead. The fire having passed only yesterday, these animals were still good and fresh, and many of them exceedingly fat. Our road was the summit of the Hair Hills [Pembina Mt.], where the open ground is uneven and intercepted by many small creeks running eastward. The country is stony and barren. At sunset we arrived at the Indian camp, having made an extraordinary day's ride, and seen an incredible number of dead and dying, blind, lame, singed, and roasted Buffalo. The fire raged all night toward the S. W."

Hind, in 1859, made similar observations:[64]

"Blind Buffalo," he says, "are frequently found accompanying herds, and sometimes they are met with alone. Their eyes have been destroyed by prairie fires; but their quickened sense of hearing and smell, and their increased alertness enable them to guard against danger; and makes it more difficult to approach them in quiet weather than those possessing sight. The hunters think that blind Buffalo frequently give the alarm when they are stealthily approaching a herd in an undulating country. When galloping over stony ground, blind Buffalo frequently fall, but when quietly feeding they avoid the stones and boulders with wonderful skill."

Treacherous Bogs

The obstinacy in adhering to one course, that characterized the Buffalo, often led many to their death in the treacherous bogs. Dodge says:[65]

[63] Journal, pp. 253–54.
[64] Ass. & Sask., p. 107.
[65] Hunting Grounds, p. 122.

"Late in the summer of 1867, a herd of probably 4,000 Buffalo attempted to cross the South Platte, near Plum Creek. The water was rapidly subsiding, being nowhere over a foot or two in depth, and the channels in the bed were filled or filling with loose quicksands. The Buffalo in front were soon hopelessly stuck. Those immediately behind, urged on by the horns and pressure of those yet farther in rear, trampled over their struggling companions, to be themselves engulfed in the devouring sand. This was continued until the bed of the river, nearly half-a-mile broad, was covered with dead or dying Buffalo. Only a comparatively few actually crossed the river, and these were soon driven back by hunters. It was estimated that considerably over half the herd, or more than 2,000 Buffalo, paid for this attempt with their lives."

Such sights were far from rare along the Missouri, though seldom seen on so large a scale.

I doubt not that every great bog and quicksand in the Central Northwest will prove on drainage to be a Buffalo bone-yard, containing countless skeletons that date from the earliest days; and there can be little question that, in a measure, this is true also of Pennsylvania.

The Arrow Indian

The primitive Indian was far from being the greatest enemy of the Buffalo. Armed with bow and arrow or lance, and without the aid of a Horse, he could scarcely count solely on the Buffalo for his livelihood. In winter, he could pursue the animals on snowshoes, and slay them easily enough. But there was rarely sufficient snow for this: all the circumstances precluded the possibility of great destruction of Buffalo life by this means. Moreover, the opportunities for such slaughter were confined to the North. On rare occasions, the tribe could unite and form a Buffalo pound. But there was usually a sufficiency of small game to make this great effort not worth the while; and I doubt not that, before the coming of the Horse and rifle, the Redman did little harm to the great Bison herds. These two principal aids arrived together on the Buffalo range, about the close of the 18th Century, and they marked the beginning of the epoch of extirpatory slaughter by man.

Rivers and Rotten Ice

By far the worst destroyer of the Buffalo in ancient days was treacherous ice in the springtime. All winter, the Buffalo herds of the colder range were accustomed fearlessly to cross and recross the icebound rivers. Springtime comes with the impulse to wander farther north; the herds are more

compacted now; they slowly travel on their route; river after river is crossed at first. But a change sets in; the ice grows rotten; to all appearance it is the same, but it will no longer bear the widely extended herd. The van goes crashing through to death, and thousands more are pushed in by the oncoming masses behind.

The records of early travellers, we now realize, have much of this subject. But the best I can find is still from the garrulous and ever-delightful Alex. Henry:[66]

"March 30, 1801.—It [the ice on Red River] continued to drift . . . bearing great numbers of dead Buffalo from above, which must have been drowned in attempting to cross while the ice was weak. . . .

"Wednesday, April 1st. The river clear of ice, but drowned Buffalo continue to drift, by entire herds. Several are lodged on the banks near the fort. The women cut up some of the fattest for their own use; the flesh appeared to be fresh and good. It is really astonishing what vast numbers have perished. They formed one continuous line in the current for two days and nights. One of my men found a herd that had fallen through the ice in Park River, and all been drowned; they were sticking in the ice which had not yet moved in that part."

Later, writing of the Mandans on the Missouri, he says:

"When they collect the driftwood, great numbers of drowned Buffalo that have perished in attempting to cross above when the ice was getting bad, float down; those animals the natives are very careful to haul on shore, as they prefer such flesh to that killed in any other way."[67]

April 7th. "The women continue to cut up drowned Buffalo to make tallow."

April 18th. "Rain; drowned Buffalo still drifting down the River, but not in such vast numbers as before, many having lodged on the banks and along the beach."[68]

April 25th. "Drowned Buffalo drift down river day and night."[69]

May 1st. "The stench from the vast numbers of drowned Buffalo along the river was intolerable."[70]

May 2nd. "Two hunters arrived . . . from Grandes Fourches. . . . They tell me the number of Buffalo lying along the beach and on the banks above, passes all imagination. They form one continuous line

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[66] Journal, p. 174.
[67] As above, p. 341.
[68] As above, p. 175.
[69] As above, p. 176.
[70] As above, p. 177.

and emit a horrid stench. I am informed that every spring it is about the same."[71]

The distance was 35 miles, and a Buffalo every 10 yards on each side would be within the terms of the description. This would total over 20,000 carcasses.

Dr. E. Coues, commenting on this in a footnote, says:[72]

"This account is not exaggerated. John McDonnell's Journal of May 18, 1795, when he was describing Qu'Appelle River, states, 'Observing a good many carcasses of Buffalo in the river and along the banks, I was taken up the whole day in counting them, and, to my surprise, found I had numbered when we put up at night 7,360, drowned and mired along the river and in it. It is true, in one or two places, I went on shore and walked from one carcass to another where they lay from three to five files deep."[73]

For generations, the dwellers on the Missouri River were familiar with the yearly flood that bore countless Buffalo hulks to be packed away in the Mississippi mud, that in some far, geological day will be rock, all stored and storied with unnumbered bones. Now we know that all the Northern rivers made their death-trap every spring; and, since their sum of dangerous length must have been not less than 20,000 miles, we can form an estimate of the prodigious slaughter that was caused by rotten ice. Clearly, the destruction by Nature's own means was so great that the Buffalo can have done no more than barely hold its own in the fight; and when the rifle also came upon the scene, its doom was sealed.

As I sat in his log museum, up in the mountains during the blizzard of Oct. 30, 1899, Edwin Carter, the naturalist, of Breckenridge, Colo., made a curious observation. He was familiar with the Buffalo in the '60's, and said:

"In my opinion, the Buffalo was a dying race. In their palmiest days, calves were comparatively scarce in the herds, showing that sterilization, the first process of natural extinction, had set in. In the Lost Park herd, calves were rarely seen."

However, I can find no one who agrees with him in this belief. Experience in our Buffalo Parks is a sufficient refutation.

The Buffalo's Age

The solitary bulls, noted later, were probably far over 20 years of age. Domestic bulls continue to breed till considerably over a dozen years old.

[71] Journal, p. 177.
[72] As above, p. 174.
[73] Masson, I, 1889, p. 294.

PLATE XCIX.—GOING TO WATER

These were past breeding, and the Buffalo seems to have been longer lived than the ordinary bovine. The Hon. R. F. Pettigrew, of South Dakota, tells me that a Buffalo bull calf that he caught in 1882 was still living in Buffalo City Zoo in 1902; and by its continued vigour gave every promise of a much more extended life.

The cows seem equally long-lived. Charles Payne, of Wichita, tells me of one that was still breeding and vigorous in her twenty-ninth year. Buffalo Jones says: "The natural life of the Buffalo is much longer than is that of domestic Cattle. I frequently saw animals so old, their horns had decayed and dropped off, which indicated that they live to a patriarchal age. I saw a Buffalo cow in the Zoological Garden in Paris which was 31 years old, and I am sure I have seen wild ones from 10 to 15 years older."[74]

Since the cow begins to breed at 3 years, and has a calf each spring (or every other spring) for about 30 years, the diminution of the Buffalo as a wild race, cannot be, as some have claimed, due to infecundity.

Buffalo-birds

In all this pastoral scene, there is a flock of small black birds—"cow-birds" or "buffalo-birds" they are called. They haunt the Buffalo as Negroes do a Mississippi raft-house; sometimes on it, sometimes on the nearest land, but always moving when it moves, and recognizing it as head-quarters.

The cowbird (*Molothrus ater*) is a well-known member of the Blackbird family. It is peculiar in this: it does not pair, make a nest, nor bring up its own young. Free love is its habit; and, when the female is ready to lay, she searches for the nest of some small bird, and in it abandons her offspring to a foundling's chances with a strange foster mother. Then, back she hies her to the merry group that lives and revels around the Buffalo herd.

Sometimes, the cowbirds walk sedately behind their grazing monster; sometimes they flit over, snapping at flies; often they sit in a line along the ridge-pole of his spine. Their attachment to the Buffalo was so close that an Indian myth tells of their nesting in the wool between the horns of the big bull; rather a fearsome home-site, one would think, during combat of the bull with some huge rival. But there are some foundations for the myth. First, they do not nest elsewhere; furthermore, I am told by "old-timers" that skulls of Buffalo, still clad in their black shock of hair, were often used by little birds as nesting places.

One more incident: In the park at Silver Heights, near Winnipeg, is a

[74]Adv., pp. 235–36.

herd of a dozen Buffalo. All summer, they are followed by the usual flock of cowbirds, which fly southward when cold weather arrives. But in the autumn of 1900, one stayed when the others left. All through that Manitoba winter, it remained with the Buffalo, especially with the biggest bull of the herd. Its food was of the Buffalo's food; by day, it flitted near or warmed its toes in the wool of the animal's back; by night, it snuggled on a sort of hollow it had made in the wool just behind his horns. The Buffalo was protector of the bird against famine, frost, and the attacks of both animal and human foes; for he was so fierce that none dared go near him, even to inspect more closely the cowbird that had committed itself to his charge. This incident is attested by Dr. S. J. Thompson, the veterinary of the Province; by George Grieve, the taxidermist; and by T. A. Prescott, the keeper of the zoo.

Grieve tells me that he thinks the bird was wounded, and unable to fly when its kinsfolk went south; and so made the best of the situation. And not so very bad it proved, for it was fat and fit in the spring.

Social Amusement

The only approach to social amusement that I have ever heard of, was that described to me by Charles Norris, a cowboy of New Mexico, who, in 1886, watched a band of Buffalo at their watering place. After drinking very heavily, he says, they played about like calves, and a number of them amused themselves by jumping off a steep bank into the water four feet below, running round to climb the bank at a low place, and repeating the performance many times.

Mating

The Buffalo bull is so exemplary in his behaviour toward the calf that some observers believed the species to be monogamous. Thus Audubon and Bachman say:[75]

"The Bison bulls generally select a mate from among a herd of cows, and do not leave their chosen one until she is about to calve.

"When two or more males fancy the same female, furious battles ensue, and the conqueror leads off the fair cause of the contest, in triumph.

. . . . . .

"It frequently happens that a bull leads off a cow, and remains with her, separated during the season from all others, either male or female."

[75] Q. N. A., II, pp. 37–38.

A fine illustration of the bull's strength and devotion is furnished by Charles Aubrey. He writes:

"My old Indian friend, White-Calf, related an instance of the wonderful strength of the Buffalo bull. While on a journey to war to the South with a large party of Blackfeet, they saw, as they approached the crossing of a river, what looked like a person, showing his head now and then above the bluff bank, as the Buffalo passed near it on their way to water.

"Looking through his spy glass, it was seen to be a Bear lying in wait to kill a Buffalo. The warriors sat down to watch the result. After a time, a cow came along on her way to water, and took the trail close under the bluff where the Bear lay. She was followed by a bull which, however, had for some reason lagged a little behind. The Bear sprang upon the cow, and attempted to drag her down. She cried in alarm and struggled fiercely to shake him off. At her cry, the bull charged; as the cow swung around with the Bear, the bull could not at first attack. But in a moment his chance came. He caught the Bear on his horns under the stomach and tossed him high in air, then caught him on his horns before he struck the ground, and tossed him again. When the Bear struck the ground he was broken down in the hind parts and his entrails were hanging out. He dragged himself away, while the bull made off with the cow."[76]

Other observers deny the existence of any such ideal condition. They maintain that there is no mating, and that the species is promiscuous. Yet others assert that extreme polygamy is the rule—that the strongest bull drives out and holds the herd as his harem. The last theory seems best supported.

Rival Bulls

That great battles take place between rival bulls, there can be no doubt. The annual ferment, the disturber of so much animal peace, sets in during July—earlier in the South, later in the North—and continues for about two months. Catlin's picture is that of a man who had seen it many times:

"The '*running season*,' which is in August and September," he says, "is the time when they congregate into such masses, in some places, as literally to blacken the prairies for miles together. It is no uncommon thing at this season, at these gatherings, to see several thousands in a mass, eddying and wheeling about under a cloud of dust, which is raised by the bulls, as they are pawing in the dirt, or engaged in desperate combats, as they constantly are, plunging and butting at each other in the most furious manner. In these scenes the males are continually following the females, and the whole

[76] Forest & Stream, July 25, 1908, p. 134.

mass are in a constant motion; and all bellowing (or 'roaring') in deep and hollow sounds; which, mingled all together, appear, at the distance of a mile or two, like the sound of distant thunder."[77]

A Battle of Giants

As an illustration of the strength and fighting tenacity of the bull, my friend, Dr. R. M. Simpson, of Winnipeg, furnishes the following: In July, 1906, he was driving a Horse and buckboard on the Winnipeg and Woodland trail. At about 11 A.M., when some 20 miles west of Winnipeg, he saw on the level prairie 2 or 3 miles ahead, what looked like two large dark animals fighting. As he drew near, he found they were a Buffalo bull and a big Shorthorn bull.

They were on their knees, head to head, with horns partly locked; and, judging from the extent of ground torn up, must have been at it for hours. They paid no heed to him as he approached, but continued vigorously charging, fencing, working around, bellowing, and slashing at each other.

Both were gored and ripped around shoulders and flanks, also were frothing and bleeding at the nose, especially the Shorthorn; and yet both seemed full of fight and energy.

Simpson watched them for half an hour, and in all that time the battle continued.

The Doctor then went on to Woodland, where he had luncheon, did some business, and at about 3 P. M., returned, to find the two bulls still at it. Apparently they had never ceased, and were now nearly exhausted. Both had much hair scraped off, and were badly ripped on the sides; and both were bleeding profusely at the nose.

The battle was going on as before, except that they did not bellow now. The rests between attacks were much longer, their breathing was very hard and laboured, and they rested long on their knees with heads together, making occasional feeble passes at each other. It was a very hot day, and they must have suffered terribly from thirst.

They were too much exhausted to trouble him, so the Doctor stood close by and watched them for about an hour, during which time they continued the battle. They were evenly matched, and in this struggle of some six hours, had evidently fought each other to a standstill. Neither would give in, and the Doctor was obliged to leave them at it. The Buffalo seemed, if anything, stronger than the Shorthorn as he drove away. He is not sure of the finish, but has the impression that the Shorthorn was rescued by its

[77] N. A. Ind., I, p. 249.

PLATE C.—THROUGH THE MIST
Drawn by E. T. Seton, 1892

owner. The Buffalo turned out to be an escape from the Stony Mountain herd, 16 miles north of Winnipeg.

A Finish Fight

Long ago, my old friend, Director Arthur E. Brown, of the Philadelphia Zoo, gave me the story of a finish fight between two big Buffalo bulls in his care. The herd of nearly a dozen was in a large, strong paddock. The boss was a huge brute, but was not a "bad boss"; that is, he did not persecute his underlings. There was a younger bull rising 4, who believed that he could overcome the king, and take his place. There were one or two preliminary skirmishes during the early summer.

Then, one morning in July, the keeper was aroused by the bellowing of combat. The fight was surely on.

By manœuvring, the men got the cows and calves out of the paddock; but the two bulls were fighting furiously, and ignored all attempts to separate them. The battle continued for hours.

Then it seemed that the younger bull had worn the older fellow out. Now the boss tried to escape; and in a state of nature, would have done so. But the high, strong fence was too much for him.

In spite of all that the keepers could do with ropes, lassos, planks, pitchforks, firebrands, blank cartridges, and bales of hay thrown in as buffers, that victorious bull backed up to one side, and charged the full width of the enclosure, with all his 2,000 pounds of fury, to drive his horns deep into his helpless, plunging, moaning foe. Again he backed; and again, with the frightful impact of a charge, impaled him; and again and again, with remorseless rage, till the poor, old king lay dead against the fence—a shocking mass of broken bones and gory flesh, pierced in a hundred places, and belching the last of his blood on the red and torn-up ground.

The Lone Bull

In the Buffalo days, the Lone Bull was a familiar figure on the landscape. Whenever, far, far away, the eye caught the black spot that meant a Buffalo, with no other black spots near, all the wise folk knew that it was a lone bull —a tough, old outcast, of no interest to those who sought for meat.

Since the range Cattle have replaced the Buffalo, the lone bull of the new species is as conspicuous as ever. It is the same among the wild Cattle of Chillingham Park, England. It is the same among the Muskoxen; and probably the same among all the bovine kinds. Who is he? Why always alone?

PLATE CI.—EARLIEST KNOWN PICTURE OF AMERICAN BUFFALO

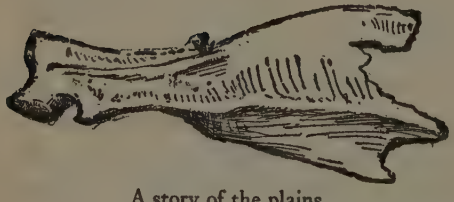
From Gomara's Historia de las Indias Saragossa, 1552-1553. Folio.
In New York Public Library (Lenox Building)

Cattalo yearling in herd of Buffalo Jones

From pen sketch by E. T. Seton
(Courtesy of the United States National Museum)

Cattalo cow in herd of Buffalo Jones

From pen-and-ink sketch by E. T. Seton
(Courtesy of the United States National Museum)



A story of the plains

The big bull collected by W. T. Hornaday

From pen-and-ink sketch by E. T. Seton
(Courtesy of the United States National Museum.)

PLATE CII.—PEN DRAWINGS OF BUFFALO, ETC.

We find the answer clearly set forth on noting the life and politics of a Buffalo herd that has been under close observation.

In Salt Lake, Utah, is Antelope Island, about 50 square miles in extent. In 1905, the Buffalo on it numbered 28. Friends in Salt Lake City have given me an idea of what has been going on in that herd, ever since they were turned loose and left free to resume their tribal life, a dozen years ago. The strongest bull takes possession of all the best things—the wallow, the choice food, the shady spot in summer, the sheltered nook in winter, and the majority of the cows. He would take all, if he had the wit, and if the cows accepted his view of the matter. The lesser bulls keep out of his way, and take what they can get of his leavings.

From time to time, some growing, lusty, young fellow tries a bout with the "boss," and usually gets the worst of it. But a time comes, soon or late, when the "boss is licked." He is driven out of the herd, and far away from it; forbidden to return at the peril of his life. And the new king reigns in his stead, to tyrannize over the cows and the lesser bulls, even as the old king had done before.

The reign of each "boss" is usually three or four years; that is, from about his fourth to his eighth year. I have no doubt that this explains the clan life of the Buffalo. It is a well-known fact, as we have learned, that any solitary Buffalo seen on the Plains was always an outcast old bull, doubtless one that originally had been driven out of the herd; and, becoming indifferent to the other sex, remained more or less solitary from choice.

These old bulls are rarely molested by hunters, human or brute. They are too tough for the one to eat, or for the other to kill. But sometimes the Wolves, when hard pressed by hunger, will unite in a large band, and attack even an old bull, if no better prey be in sight. Catlin was witness of several of these terrific encounters, and has left this description:[78]

"During my travels in these regions, I have several times come across such a gang of these animals [Wolves] surrounding an old or a wounded bull; where it would seem, from appearances, that they had been for several days in attendance, and at intervals desperately engaged in the effort to take his life. But a short time since, as one of my hunting companions and myself were returning to our encampment, with our Horses loaded with meat, we discovered, at a distance, a huge bull encircled with a gang of White Wolves. We rode up as near as we could without driving them away, and, being within pistol shot, we had a remarkably good view, and where I sat for a few moments and made a sketch in my notebook, after which we rode up and gave the signal for them to disperse, which they instantly did,

[78]N. A. Ind., I, pp. 257–58.

withdrawing themselves to the distance of fifty or sixty rods, when we found, to our great surprise, that the animal had made desperate resistance until his eyes were entirely eaten out of his head, the grizzle of his nose was mostly gone, his tongue was half eaten off, and the skin and flesh of his legs torn almost literally into strings.

"In this tattered and torn condition, the poor old veteran stood bracing up in the midst of his devourers, who had ceased hostilities for a few minutes, to enjoy a sort of parley, recovering strength and preparing to resume the attack in a few moments again. In this group, some were reclining to gain breath, whilst others were sneaking about and licking their chaps in anxiety for a renewal of the attack; and others, less lucky, had been crushed to death by the feet or the horns of the bull.

"I rode nearer to the pitiable object as he stood bleeding and trembling before me, and said to him, 'Now is your time, old fellow, and you had better be off.' Though blind and nearly destroyed, there seemed evidently to be a recognition of a friend in me, as he straightened up; and, trembling with excitement, dashed off at full speed upon the prairie, in a straight line. We turned our Horses and resumed our march; and when we had advanced a mile or more, we looked back, and on our left, where we saw again the ill-fated animal surrounded by his tormentors, to whose insatiable voracity he unquestionably soon fell a victim."

Fremont has given us a thrilling description of the treatment accorded an old bull by his younger, stronger relatives, He says in the narrative of his famous journey across the Plains:[79]

July 7, 1842. "In the course of the afternoon, dust rising among the hills at a particular place, attracted our attention; and, riding up, we found a band of 18 or 20 Buffalo bulls engaged in a desperate fight. Though butting and goring were bestowed liberally, and without distinction, yet their efforts were evidently directed against one—a huge, gaunt, old bull, very lean, while his adversaries were all fat and in good order. He appeared very weak, and had already received some wounds, and, while we were looking on, was several times knocked down and badly hurt, and a very few moments would have put an end to him. Of course we took the side of the weaker party, and attacked the herd; but they were so blind with rage that they fought on, utterly regardless of our presence, although on foot and on horseback we were firing in open view within twenty yards of them.

"But this did not last long. In a very few seconds we created a commotion among them. One or two, which were knocked over by the balls, jumped up, ran off into the hills; and they began to retreat slowly along a

[79]Expl. Exped., p. 26.

broad ravine to the river, fighting furiously as they went. By the time they had reached the bottom, we had pretty well dispersed them, and the old bull hobbled off to lie down somewhere."

The question arises, Who was that old bull? I suspect that he was the great-grandfather of many of those who were ill-treating him, and further, that he ill-treated his own great-grandfather in precisely the same way.

The Great Bands

It was during the migrations only that the very large herds were seen. Bands of a few thousand were found at all seasons, but the millions came together only on some great general impulse.

Let us follow one of the herds moving northward to its summer home from the sheltered bottom-lands along the Missouri, in central Dakota, where it has wintered.

Before there is yet any visible spring in the land, the spirit of unrest comes on the animals. It may be that the final touch is given by a warm, sunny day. Some old cow, with a bunch of from 50 to 100 followers, turns her nose northward. Their grunting spreads an epidemic of unrest; and from every valley, a long, black stream pours forth. As they top the uplands, others and yet others come to view. The general move is northward, but their disposition is to condense into one herd.

As night comes down, black and chill, they leave the exposed ridges, and shelter in the hollows. Cold weather and more snow may follow, but the impulse to travel possesses them now. Once it is given command, it changes not in force or direction, till the remembered pastures are reached. Rivers may cross their path. These, if frozen, are unnoticed; if open, they are swum; if covered with rotten ice, the ice is broken eventually by the weight of the herd. Many are drowned, but the rest swim through and continue their march. An onset of hunters may swerve them for a time, but it does not change their main trend.

For three or four weeks this continues, and the blackening horde comes swarming down the long, level prairies of the Red River Valley. Now they are nearing their familiar summer haunts, and the bands which united originally to form the herd, begin to go their separate ways. Here, again, some old leader cow sets the example; and, stringing after her, come many cows and yearlings, mostly relatives by marriage or descent.

The Matriarch and Her Clan

In a broad sense, it will be seen that this small local herd is a family—or rather a clan. These general principles will be found applying, and they

explain the clan life as well as the clan continuity. Their leader is always an old cow—there is abundance of evidence for this—doubtless she is the grandmother of many of them. As Long says:[80] "Cows are often seen accompanied by the calves of three seasons."

The males remain with the females, and take an active interest in the young. Buffaloes, like all sociable animals, know and stay with their personal acquaintances; they resent the approach of strangers; migrants work back to their birthplace. Whenever a local band of Buffalo has been wiped out, their pasturage has remained vacant for years; so it is unlikely that this group is finally scattered during the annual herding. The evidence derived from common range Cattle sustains this idea; for, in spite of the annual round-ups which correspond to the annual herding of the Buffalo, we usually find the same little bunch of Cattle (easily distinguishable by their marks) on the same feeding ground, season after season. Finally, the Bison is usually polygamous, or sometimes promiscuous; so that those living together are sure to be much interrelated.

The blood-and-clan feeling of the group, therefore, I think well established; but, because it has been questioned, I was glad, long after the above was written, to find the following penned by an undoubted authority, Buffalo Jones:[81]

"Each small group is of the same strain of blood. There is no animal in the world more clannish than the Buffalo. The male calf follows the mother until two years old, when he is driven out of the herd, and the parental tie is then entirely broken. The female calf fares better, as she is permitted to stay with her mother's family for life, unless by some accident she becomes separated from the group.

"The resemblance of each individual of a family is very striking; while the difference between families is as apparent to the practised eye as is the Caucasian from the Mongolian race of people.

"These groups are as quickly separated from the great herd after a stampede as is a company of soldiers from its regiment at the close of 'dress parade.' The several animals know each other by scent and sound; they grunt similarly to a Hog, but in a much stronger tone, and are quickly recognized by every member of the family. When separated by a stampede or other cause, they never rest until they are all together again.

"A pathetic sight was sometimes witnessed when the mother of one of these families was killed at the first shot. They were so devoted to her, they would linger and wait until the last one could be easily slain."

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[80]Exped. Rocky Mts., p. 473.

[81]Adv., p. 234.

So far as I can learn, the clan separates from the herd, but does not further disintegrate. It rambles about, in a radius of perhaps ten miles from its favourite drinking place; and, wherever it goes, it is followed by one or two ever watchful Gray-wolves—the parasites of that particular clan.

Mother—and Bearing Time

Some time in April, usually, though possibly as early as January and as late as August, the full-grown cow has finished her 9½ months' gestation. True to a universal instinct, she slinks off by herself to some slight hollow—for such there are even on the levellest prairie—and there is born the calf, or, on some rare occasions, twins.

The labour is remarkably short and easy. Dr. Frank Baker, of the National Zoo, writes me that normally it occupies from 25 to 45 minutes. A recent case in that Park was timed by the head keeper, W. H. Blackburne, who says that "the calf had been cleaned, and was nursing, 26 minutes after the cow stopped eating hay and lay down." Thus, in less than an hour, the mother is able and ready to meet any enemy that may come to injure her young.

From one or two Wolves, she is very well able to guard the calf; but half-a-dozen give a serious aspect to the situation, even though she stand with the little one under her body. Usually, however, help is at hand. Her loud, angry snort or threatening bellow will quickly bring the bulls to her aid. And the effectiveness of their response may be judged by the incident related below by Dodge.

Once the calf is strong on its feet—and that means when three or four days old—its life is with the herd, and it is effectually guarded. Ordinarily, when the old ones lie down for the night, they may be scattered; but the near appearance of their tireless, omnipresent enemy, the Gray-wolf, is enough to make them rearrange their places, condensing their band; the bulls, as a matter of course, now taking the outside.

Charles Aubrey, the old Buffalo-hunter, says:

"In calling her young, the Buffalo mother does not make the bawling cry of the domestic cow, but gives out a peculiar muttering, grunting sound, the calf answering in much the same manner. This was often to be heard when a wide river was to be crossed.

"If all was quiet, and there was no cause to hurry, the mother in swimming kept her calf on the upstream side. When the calf grew tired, if small, it often climbed on the back of its mother, and in that way she would ferry her young across swift-rushing rivers.

"The Buffalo cow gives a rather limited quantity of milk, but its quality is very rich. To the Indian hunter, the bag of a cow with calf was a great delicacy, for it was rich in fatty oils."[82]

Father and Little One

An army surgeon related to Colonel Dodge the following delightful incident:[83]

"He was one evening returning to camp after a day's hunt, when his attention was attracted by the curious action of a little knot of 6 or 8 Buffalo. Approaching sufficiently near to see clearly, he discovered that this little knot were all bulls, standing in a close circle with their heads outwards, while in a concentric circle at some 12 or 15 paces distant, sat, licking their chaps in impatient expectancy, at least a dozen large Gray-wolves (excepting man, the most dangerous enemy of the Buffalo).

"The doctor determined to watch the performance. After a few moments, the knot broke up; and, still keeping in a compact mass, started on a trot for the main herd, some half a mile off. To his very great astonishment, the doctor now saw that the central and controlling figure of this mass was a poor little calf, so newly born as scarcely to be able to walk. After going 50 to 100 paces the calf lay down, the bulls disposed themselves in a circle as before; and the Wolves who had trotted along on each side of their retreating supper, sat down and licked their chaps again; and though the doctor did not see the finale, it being late and the camp distant, he had no doubt that the noble fathers did their whole duty by their offspring, and carried it safely to the herd."

Fremont records a similar incident that he observed on the Platte River in 1842. In this case, however, the Wolves were too numerous for the would-be rescuer, and the affair had a tragic end:

July 4. "While we were at breakfast," he says,[84] "a Buffalo calf broke through the camp, followed by a couple of Wolves. In its fright it had probably mistaken us for a band of Buffalo. The Wolves were obliged to make a circuit around the camp, so that the calf got a little the start, and strained every nerve to reach a large herd at the foot of the hills, about 2 miles distant; but first one, and then another, and another Wolf joined in the chase, until his pursuers amounted to 20 or 30, and they ran him down before he could reach his friends. There were a few bulls near the place,

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[82]Forest & Stream, July 25, 1908, p.133.
[83]Hunting Grounds, p. 125.
[84]Expl. Exped., p. 22.

and one of them attacked the Wolves and tried to rescue him; but was driven off immediately, and the little animal fell an easy prey, half devoured before he was dead. We watched the chase with the interest always felt for the weak; and had there been a saddled Horse at hand, he would have fared better."

Family Life

In both cases, the mother seemed to be missing. Some observers think her negligent of her duties. There is, indeed, great individual variation in this respect; but, ordinarily, she is the best protector the little one can have, and is afraid of nothing when the calf is threatened. Yet many times she acts in a dumb, cowed way, especially when the assailant of the youngster is a man.

James K. Darnell, of Breckenridge, Colo., related to me that in the early '70's, when he was cow-punching on the Plains, the Buffalo were very plentiful. He often amused himself by roping the calves. When one was caught, he would jump off, remove the lasso, and hold it with his hands. The mother would stand at a distance of 100 yards gazing anxiously, neither cow nor calf making any sound. As soon as he let the calf go, the mother, seeing it was free, knew it would take care of itself, and turning tail, went off at full gallop, without even looking behind.

Had the calf, by bellowing, made it clear to his mother that he was in peril of his life, I fancy it would have made a profound change in her demeanour.

In proof of this is an experience recorded by Buffalo Jones,[85] while on his last expedition to capture Buffalo alive. It shows that the cow Buffalo is no respecter of persons when once her dull wit has grasped the idea that they are unworthy of respect. When the last calf was lassoed, its mother rushed furiously to the rescue. After vainly trying to drive her off, Colonel Jones very unwillingly drew his revolver and shot her dead.

Nor does the maternal instinct suffer when the animal is tamed, and taught less distrust of man, as Jones expressly says:[86]

"Sometimes when I now lasso a calf of those in domestication and attempt to lead it away, the mother will quickly place herself in front of her baby, and thrust a horn under and often through the loop of the rope, and hold the Horse and rider perfectly solid, while, if the rope is slackened, she in some instances will free the calf entirely."

We have seen that the mother, and all the possible fathers and uncles,

[85] Forty Years, p. 135.
[86] As above, p. 235.

are ready to do their duty in protecting the calf. Now comes Buffalo Jones to attest that the aunts also are quick to respond. Thus the ideal of family feeling is complete in the Buffalo, setting him in high and honourable contrast to most other polygamous animals; offering, indeed, some refutation to the dictum that such a marriage arrangement is a foredoomed failure.

"Often," says Colonel Jones,[87] "have I so crippled a calf that it was impossible for it to follow the herd, and its pitiful bleating would hold the family until I could kill all desired. Should the calf be wounded in the fore or hind parts, the old cow would actually support the parts so crippled, and it would walk away on the normal parts by such aid."

"In pursuing a large herd of Buffaloes," says Catlin,[88] "at the season when their calves are but a few weeks old, I have often been exceedingly amused with the curious manœuvres of these shy little things. Amidst the thundering confusion of a throng of several hundreds or several thousands of these animals, there will be many of the calves that lose sight of their dams; and being left behind by the throng, and the swift passing hunters, they endeavour to secrete themselves, when they are exceedingly put to it on a level prairie, where nought can be seen but the short grass of six or eight inches in height, save an occasional bunch of wild sage a few inches higher, to which the poor affrighted things will run; and dropping on their knees, will push their noses under it, and into the grass, where they will stand for hours with their eyes shut, imagining themselves securely hid, whilst they are standing up quite straight upon their hind feet and can easily be seen at several miles distance.

"It is a familiar amusement for us, accustomed to these scenes, to retreat back over the ground where we have just escorted the herd, and approach these little trembling things, which stubbornly maintain their positions with their noses pushed under the grass, and their eyes strained upon us, as we dismount from our Horses, and are passing around them. From this fixed position, they are sure not to move, until hands are laid upon them, and then for the shins of a novice we can extend our sympathy; or if he can preserve the skin on his bones from the furious buttings of its head, we know how to congratulate him on his signal success and good luck.

"In these desperate struggles, for a moment the little thing is conquered, and makes no further resistance. And I have often, in concurrence with a known custom of the country, held my hands over the eyes of the calf, and breathed a few strong breaths into its nostrils; after which I have, with my hunting companions, ridden several miles into our encampment, with the little

[87] Forty Years, pp. 234–35.
[88] N. A. Ind., I, p. 255.

prisoner busily following the heels of my Horse the whole way, as closely and as affectionately as its instinct would attach it to the company of its dam."

Alex. Henry mentions expressly that the mothers come back in search of their young after the hunt is over.[89]

The Growing Calf

As the calf grows to strength and vigour, he is well able to care for himself; and the mother's gentleness gives place to firmer methods.

I remember once watching a young calf that besought his mother for food, by pushing her neck as she lay. She brushed him away with a swing of her head. He tried farther back, where, indeed, he could smell the refreshment that he needed; but it was effectively barricaded from him. Again he rubbed and leaned against his mother's neck in mute appeal; again she mutely said, "Don't bother me," and flung him afar with a swing of her massive woolly jowl.

Then did that small calf rise to the emergency in a way that filled me with glee; for, standing just beyond the sweep of mother's impatient horns, he backed and charged again and again, butting and pounding, with his tiny, budding "nubbins" of horns, against her flank—her only tender spot—until she could stand it no longer, and leaped to her feet. Now, of course, the object he had in view was easily within his reach; and springing into place, but well forward out of reach of her first impatient but half-hearted kick, he tugged away. The mother's love was stirred in response, and her forgiveness of him was complete—it arrived, indeed, before his punishment, so that the latter came not at all.

Another glimpse of the family life, or at least, the Indian opinion of it, is afforded by the following from the pen of C. E. Denny. Referring to the rare and beautiful "Silk or Beaver robe" already mentioned, he says:

"The robe was nearly always of a cow, very fine and very light. Many explanations were given by the hunters for this peculiar coat, and the right one was no doubt that given by Montana Indians—that it was caused by the constant licking of many animals in the herd, to which some motherless calf belonged, it having become the pet of the band, the animals testifying their liking in that manner."[90]

Charles Aubrey, the old trader, says that in trading many thousands of Buffalo robes, "I have handled but three silk robes."[91]

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[89] Journal, p. 177.

[90] Forest & Stream, May 8, 1897, p. 362.

[91] As above, July 25, 1908, p. 134.

Springtime

In the early spring, the life of the herd is pleasant. Weather is bright and warm; insect pests are unknown. Before the snow is quite gone, the crocus or sandflower is greening the Plains again, and in a week changing their colour with its teeming bloom; a hundred others follow in quick succession with their rich and succulent growth.

The Buffalo grow fatter every day. All the early morning they graze. Toward ten o'clock, they lie down and chew their cud; about noon, the old cow will arise and march toward the water with the band behind her. She does not go far among the many deep-worn Buffalo trails, before finding one which is headed her way. She follows it; the others come stringing along Indian-file behind her. The only exception to the single line is made by the calves, which frisk along beside their mothers. It may be miles to the watering place, but the herd marches steadily, and with purpose.

After all have drunk their fill, they may lie down again in the neighbourhood, or maybe they will wander back to some prairie swell, on whose northern side the sun is a little less warm, or the western breeze a little stronger. There they scatter, and lie down for a two-hours' rest, till the herd is reminded of its own growing hunger, perhaps by some young "spike-horn" rising to resume the quest for food. Or, maybe, the final ounce of push that moves the landslide is supplied even by some little calf, who, desiring drink, uses vigorous means to make his mother take the posture needful to serve him.

When the Plains Are Brown

During August and September, the herd has consisted of all ages and sexes intermixed. As September wanes, the males lose interest in their partners; and now, for the first time we find the clan divided—the males in one herd, the females in another. Their lives go on as before, but they meet and pass without mixing.

The bulls have just gone through the stress time of rut and battle. They are now poor in flesh, and subdued in spirit; but the rich pasturage to which they most assiduously devote themselves begins to improve their condition. By October, the good fare shows in all. Their new growing coats are sleek, their bodies reinvigorated, their tempers more sociable; and, when late November frosts send forth the word to move, it is usual to find the clan reunited, drifting as before with the old great-grandmother in advance; the young ones scattered through it, the father and grandfather behind; and the dethroned great-great-great-grandfather roaming alone in the offing.

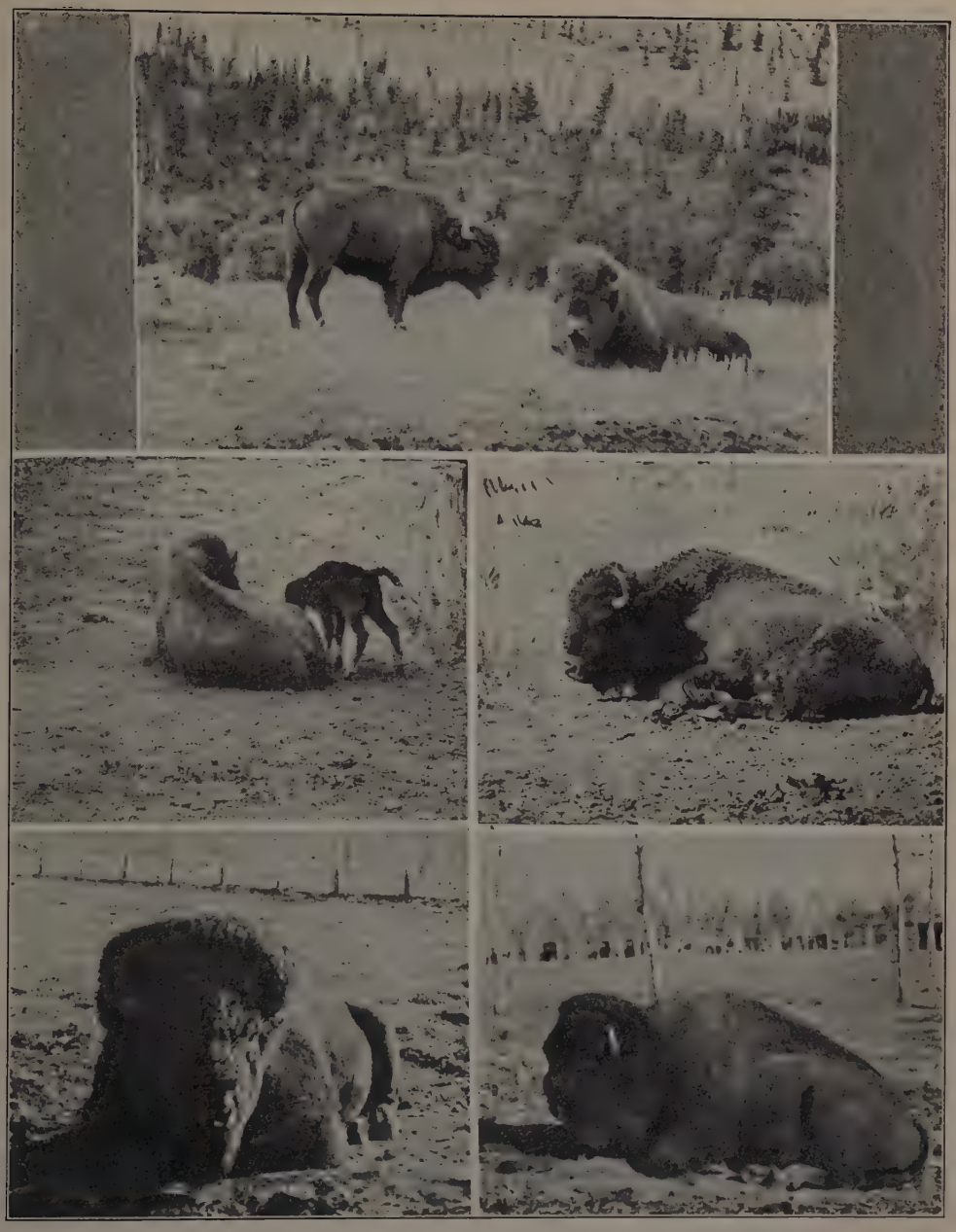

PLATE CIII.—VARIOUS BUFFALO IN ZOO

Photographs by E. T. Seton

The Passing of the Buffalo

Many able pens have recorded the service this imposing creature rendered man. It needs no telling here. He fed a quarter of a million, and clothed twice as many human beings. But these services are ended. As a wild animal, the Buffalo is gone! The great herds will never again be seen roaming the Plains.

Who is there of the present generation that does not feel profound regret at this thought, and ask himself, "Oh, why was I born too late?" What would I not give to have seen the Buffalo days and Buffalo people in their romantic prime? Much of the hungry regret that Sir Walter Scott felt over the departed glories of feudal life, is felt by every boy and young man of our country now, when he hears of the Buffalo days and the stirring times of the bygone wildest West.

Why was this extermination allowed? Why did not the Government act? This and a hundred other saddest "might-have-beens," spring forth from hearts that truly feel they lost a wonderful something, when butchers, drawn from the human dregs of border towns, were turned loose to wipe out the great herds that meant so much to all who love the wilds and the primitive life.

There is but one answer: *It was absolutely inevitable.* The Buffalo ranged the Plains that were needed by the outcrowded human swarms of Europe. Producing Buffalo was not the best use to which those plains could be put. The Buffalo, possessed of vast size and strength, of an obstinate, impetuous disposition, that would stampede in a given line and keep that line to the utter destruction of all obstacles or of himself, was incompatible with any degree of possession by white men, and with the higher productivity of the soil. Therefore, he had to go.

He may still exist in small herds in our parks and forest reserves. He may even achieve success as a domestic animal, filling the gaps where the old-time Cattle fail. But the Buffalo of the wild Plains is gone for ever; and we who see those times in the glamour of romance can only bow the head and sadly say, "It had to be. He served his time, but now his time is past."

His Monument

But he leaves behind him a lasting monument. Who that knows the West has not seen the game-trail grow into an Indian trail; the Indian trail into a pack-trail; the pack-trail into a white-man's road, that in turn is the pilot of the iron horse? The reason is simple—it is the easiest and shortest way through the hills that can be selected by long experience, and thor-

ough knowledge of the country. This idea has been worked out for the Buffalo by A. B. Hulbert in his "Historic Highways of America."[92] He points out that the Buffalo first planned the route through the Alleghanies by which the white man entered, and possessed the Mississippi Valley.

"It is very wonderful (he says) that the Buffalo's instinct should have found the very best courses across a continent upon whose thousand rivers such great black forests were thickly strung. Yet it did, as the tripod of the white man has proved; and . . . human intercourse will move largely on paths first marked by the Buffalo. It is interesting that he found the strategic passageways through the mountains . . . it is also interesting that the Buffalo marked out the most practical portage paths between the heads of our rivers, paths that are closely followed to-day, for instance, by the Pennsylvania, Baltimore and Ohio . . . Chesapeake and Ohio . . . Cleveland Terminal and Valley . . . and the Wabash Railway. . . .

"A rare instance of this is the course of the Baltimore and Ohio Railroad between Grafton and Parkersburg in West Virginia. . . . The railway has followed the trail steadily throughout its course, and when it came to a more difficult point than usual, where the railway is compelled to tunnel at the strategic point of least elevation, in two instances the trail runs *exactly over the tunnel!*"

But the white man was not the first to follow the Buffalo's paths. Professor James Mooney, of the Smithsonian Institution, has proved to us that the Sioux Indians were a race of the Atlantic Coast; that they migrated through the Alleghanies to the Mississippi Valley; and on—and yet farther on—they went. Doing what? We know to-day from their traditions, from their life, and from their route, they were *following the Buffalo.* They followed them over the mountains, by the paths the Buffaloes themselves had made. They have followed them long and far. Will they keep on, and—as many of their bravest wished to do—seek the herds no more on the vast Missourian Plains, but over the borderland, in those perfect hunting grounds where the mosquito, the smallpox, and the white man are unknown, and where alone the Buffalo bands will ever again be seen darkening the offing and "making the earth one robe"?

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[92]Prospectus to Hist. Highways Amer., Vol. I, Part II. Paths of the Great Game Animals, 1902. p. 20.

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LIFE LX—WOOD BUFFALO

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Wood Buffalo, Wood Bison, Woodland Bison, American Aurochs

Bison bison athabascæ Rhoads

(L. *Bison*, see *ante; athabascæ*, of Athabaska)

Bison bison athabascæ Rhoads, 1898, Proc. Acad. Nat. Sci., Phila., p. 498.

Type Locality—Within 50 miles, southwest of Fort Resolution, Mackenzie.

Cree & Ojibway, *Ah-thuk-ard Moos-toosh.*
Chipewyan, *Ed-jer-ay.*

"*General Characters.* Size larger, colours darker, horns slenderer, much longer and more incurved, and hair more dense and silky than in *B. bison.*

"Description of type specimen from data furnished by Professors J. Macoun and H. A. Ward; Pelage everywhere dense and silky; short and fine over much of hinder part of body, becoming very dense and curly and long anteriorly, especially on shoulders and neck, and also quite long on the frontal aspect. Colour along crest of hump and vertebral line to rump 'light brown,' shading in all directions to darker brown and becoming almost black on the whole head, legs and belly. 'Looking at head and legs you would say at once they were black.' Ears, muzzle, hoofs and horns and distal half of tail black.

"Horns (on mounted skin) very long and strongly recurved. 'Curved inward so as to come towards the eye within 2 inches of the line of the base'; nearly semicircular in exterior outline, but more abruptly incurved along terminal third. Horn-cores of detached skull strongly curved, directed at base 'slightly downward' below frontal plane; 'then outward and upward, the tips slightly incurved, the general direction of core being slightly backward; a line drawn from middle of orbit to tip of core intersecting base of core higher than in *Bison bison.*' Horn-cores nearly circular in section at base, becoming slightly flattened above, medially, 'with an obscure ridge below.'

"Measurements.—(Sent by collector with skin to Prof. Frank A. Ward.) 'Height at shoulders, 1,703 mm. (5 ft. 7¼ in.); height to rump just

in front of hind legs, 1,602 mm. (5 ft. 3¼ in.); total length of head and body, without tail 2,846 mm. (9 ft. 4¼ in.)'"[1]

Rhoads also remarks (p. 499) that "In the type, the frontal breadth between the bases of horn-cores is . . . more than 50 mm. wider than the largest old male skull of *B. bison* in the Museum of the Academy of Natural Sciences of Philadelphia."

On May 29, 1914, I visited the Calgary Museum, and examined the Radford bull. It is about 6 feet at the withers, has no mane, no beard, no "chaps." But the hair all over the body is long and curly. It has immense horns, long and curved, is of enormous bulk, evidently larger than any Plains Buffalo, and much like an Aurochs. It weighed 2,460 pounds, or 2,402 pounds after bleeding. The skeleton is in the National Museum at Washington.

The longest horns of this Buffalo recorded in Rowland Ward's Book (1922, p. 428) are in the American National Collection, and measure as follows: Length, 18¾ in.; girth, 15 in.; tip to tip, 27½ in. (owner's measurements).

History

The earliest chronicler of the Wood Buffalo was Samuel Hearne. In his Journal for Jan. 9, 1772, he describes his crossing of the Athapuscow Lake (Athabaska) to the level wooded country of the south side. Here, he says: "Buffalo, Moose and Bear were very plentiful. . . .

"The Buffalo in those parts, I think, are in general much larger than the English black Cattle; particularly the bulls, which, though they may not in reality be taller than the largest size of the English Oxen, yet to me always appeared to be much larger. . . . The horns are short, black, and almost straight, but very thick at the roots or base.

"The head of an old bull is of a great size and weight indeed: some which I have seen were so large, that I could not without difficulty lift them from the ground. . . .

"The hair of the body is soft and curled, somewhat approaching to wool; it is generally of a sandy brown, and of an equal length and thickness all over the body: but on the head and neck it is much longer than it is on any other part."[2]

In addition to this, he gives many details of its habits, etc.

So far as his narrative shows, Mackenzie did not see any Buffalo on his voyage from Chipewyan to the mouth of the Mackenzie River in 1792.

[1] Rhoads, pp. 498–99.

[2] Journey, pp. 250–52.

His Indian friends told him that there were herds of Buffalo in the woods back from the Slave River; but these, apparently, he never saw. On his return, he set out from Fort Chipewyan up the Peace River. He left Oct. 10th, of that year, and travelled till Nov. 1st., when he was at the Forks of the Peace (lat. 56° 9′ N., long. 117° 35′ 15″ W.); here he wintered. On the 19th of October, when at the Old Establishment on Peace River, he referred to the "very extensive plains, which afford pasture to numerous herds of Buffaloes."[3] In December, when at the Forks of the Peace, he says: "On either side of the river, though invisible from it, are extensive plains, which abound in Buffaloes, Elks, Wolves, Foxes, and Bears."[4] However, apparently, *he did not see any* till the May following, when he left his winter camp, and travelled westward. Thenceforth, the Buffalo seemed to be a daily sight; and, referring to the great valley of the Peace after it left the Rockies, he says:

"This magnificent theatre of nature has all the decorations which the trees and animals of the country can afford it: groves of poplars in every shape vary the scene; and their intervals are enlivened with vast herds of Elks and Buffaloes; the former choosing the steeps and uplands, and the latter preferring the plains."[5]

Mackenzie did not distinguish the Wood Buffalo from those of the Plains. Richardson, also, writing in 1829, after spending several seasons in the country, treats Plains and Wood Buffalo as the same, although he records the fact that the Wood Buffalo are said to be "of a greater size."[6]

Henry Y. Hind says: "The skin of the so-called Wood Buffalo, of which I saw two at Red River, is much larger than that of the common animal. The hair is very short, mane or hair about the neck short and soft, and altogether destitute of curl, which is the common feature in the hair of the prairie animal."[7]

Dr. J. A. Allen, in his monograph on the Common Bison or Buffalo, Hayden Survey, 1875 (pub. 1877), p. 447, discusses, without pronouncing on, the distinctions between the Wood Buffalo, the Plains Buffalo, and the Mountain Buffalo.

In 1884, when living in the Northwest, I heard much about the Wood Buffalo, and got some detailed information from Elzear Mignault, a French trader who had lived for ten years on Peace River. This I embodied in a

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[3]Voyages from Montreal, 1801, p. 125.
[4]As above, p. 130.
[5]As above, pp. 154–55.
[6]Fauna Boreali Americana, I, p. 282.
[7]Assiniboine & Saskatchewan Exploring Expedition, 1859, p. 105.

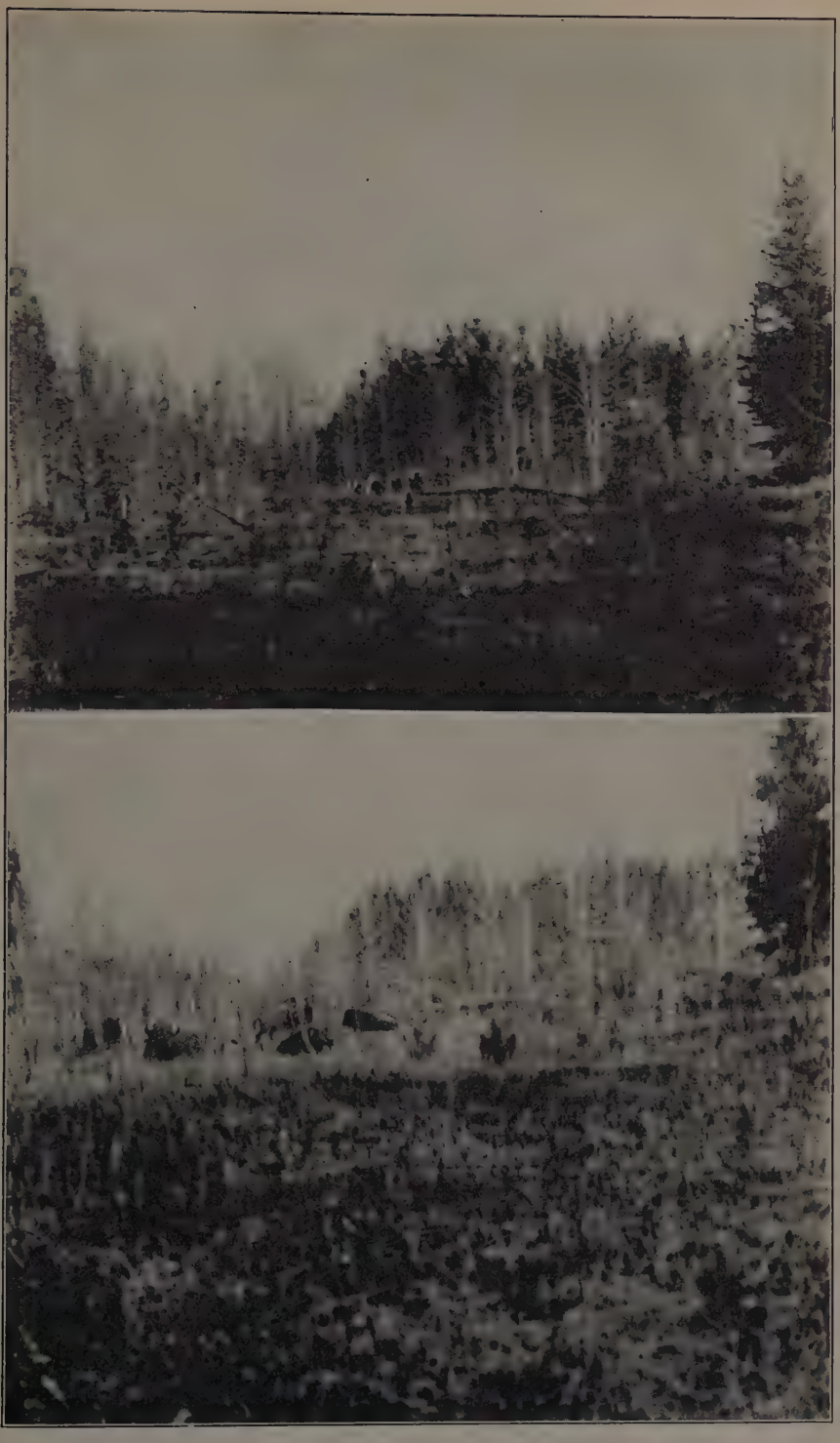


PLATE CIV.—WOOD BUFFALO
Snapshots by E. T. Seton

paper on the "Ruminants of the Northwest," 1885, and published in the Proceedings of the Canadian Institute, 1886, pp. 114–17; also in the Winnipeg *Free Press* for May 27, 1886, and in the first edition of my "Mammals of Manitoba," 1886. A part of this I reproduce:

"Mignault maintains with the Indians that it is distinct urging also in support of his opinion that the only Prairie Buffalo ever seen in the valley was killed in 1866. It was a solitary mangy bull, a complete outcast which would probably not have been the case had the Wood Buffalo been his immediate kindred. All my informants agree that the Wood Buffalo differs from its prairie relative, in being much larger and considerably darker in colour. Mignault adds that its legs are proportionately shorter, its horns less robust and more curved inwards, its hair, shorter, finer, entirely without curl, and all over of a very dark brown, almost a black in winter, but in the summer assuming a hue not unlike that of the prairie animal.

"The two forms are not distinguished on the books of the Hudson's Bay Company. . . .

. . . . . .

"When in 1875 Mignault left the Peace River, the Wood Buffalo were plentiful in the country between Dunvegan and Great Slave Lake, and the Liard and Athabaska rivers. In 1884 he heard from a comrade that they were then still common.

"The Indians, he said, call it *Ah-thuk-ard Moos-toosh*, and consider it quite distinct from the Prairie Buffalo, which they call *Mas-kootay Moos-toosh*.

"Its general habits differ a good deal from those of its prairie relative, rather resembling those of the Moose; although it is much less wary and difficult of approach than that animal.

"It is rarely found in herds, except in the fall. The greatest number my informant ever saw together in the summer was 3. These were going down to the river as he rounded a point in a barge. As soon as he came in view, they scrambled up the bank and disappeared in the woods.

"But in the month of August, the mating season, they are inclined to gather into straggling bands of both sexes and go roaming about the woods, which are made to resound with the thud and trampling of the males engaged in battle.

"During the winter, they confine themselves to heaviest and densest timber, subsisting on willow scrub, moss and such dry grass as is attainable, especially the long, coarse grasses of the sloughs.

"In the summer, they are so much persecuted by the 'bull-dog' flies

that during the warm weather, they spend the greater part of the day immersed to the eyes in some river, lake or mud-hole; and it is not uncommon for the voyageur who silently rounds some point on the Liard, Salt or Peace rivers to observe protruding from the water the black head of the fly-persecuted Buffalo. Under these circumstances the animal usually gazes stupidly for an instant, then suddenly bestirring itself, it dashes to the shore and disappears in the woods.

"They usually seek the thick swamps from preference, though they distinguish and avoid the treacherous bogs or muskegs, which are found in various parts of the country. They commonly feed during the night, as this is the only season when they are free from the torment of the gadflies. It is for similar reasons that they usually confine themselves to the dense woods in summer, for when the day chances to be cold and windy so that not a fly is to be seen, they take advantage of the opportunity to climb about even the high rocky hills."

In 1890, Warburton Pike hunted in the land of the Wood Buffalo, and secured a female specimen in February of that year. He wrote: "These animals go by the name of Wood Buffalo; and most people are of opinion that they are a distinct race from the old Prairie Buffalo, so numerous in bygone days; but I am inclined to think that the very slight difference in appearance is easily accounted for by climatic influences, variety of food, and the better shelter of the woods."[8]

In March, 1892, a male was secured by Indians within 50 miles southwest of Fort Resolution, and presented by the Hudson's Bay Company to the Canadian Geological Museum at Ottawa. It was carefully mounted, and is now on exhibition there.

In 1897, Samuel N. Rhoads, of Philadelphia, named this as the type specimen of the variety to which he gave the name *Bison bison athabascæ*.

In 1909, Harry V. Radford, of New York, armed with a permit from the authorities at Ottawa, killed a fine big Wood Buffalo bull. This is now in the Calgary Museum, as already stated.

Numbers

The countless thousands of Mackenzie's day had withered away before the all-destroying white man, with his rifle and Horse. In 1900, the Wood Buffalo was believed to be nearly extinct, some setting the number as low as 50.

In June, 1907, I got into the country, and saw a few. Altogether my

[8]Barren Ground of Northern Canada, 1892, p. 143.

MAP X.—THE WOOD BUFFALO PARK

Ten thousand five hundred square miles, set apart by the Canadian Government on Dec. 18, 1922, for the preservation of the Wood Buffalo

party saw 33, and estimated that about 300 still remained. We were satisfied, after full investigation, that hunters with rifles, not Wolves, were destroying them. The result of this report was new police regulations, and a Police Patrol. Under this kindly arrangement, the Buffalo increased.

In Sept., 1914, Francis Harper, of the Canadian Geological Survey, assisted by the Buffalo Guardian, Peter McCallum, spent a week in the Wood Buffalo country; and estimated them at 500.

The following appears in his Report: "According to McCallum, the Wood Buffaloes are divided into two main groups. It was the southern herd whose territory we had entered, while the range of the other lies northwest of Fort Smith near Little Buffalo River. Part of the northern herd was reported to have been seen within 20 miles of Great Slave Lake during the winter of 1912–13. The two ranges are separated, McCallum said, by a strip of jack pine country 20 or 30 miles wide, in which he has seen hardly a trail. He estimated that there were about 500 animals in the two herds, the northern one being slightly the larger."

In the summer of 1922, Maxwell Graham, the alert representative, of the Northwest Territory and Yukon Branch, Dept. of Interior, made a reconnaissance of the Buffalo Range. He says: "During numerous journeys on horseback, and on foot, the writer saw a total by actual count, of 114 Buffalo." He estimated the number at 1,500—500 in the north herd and 1,000 in the south.[9]

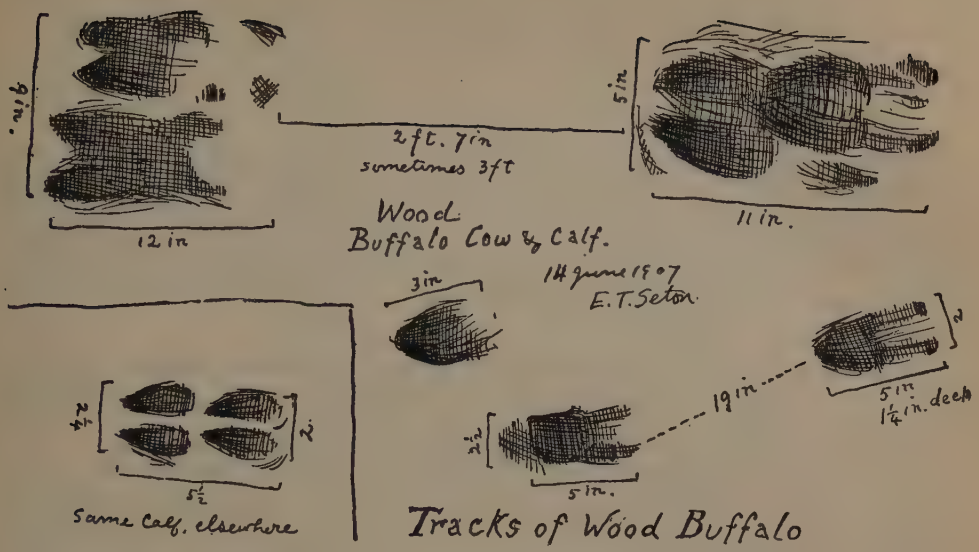
On Dec. 18, 1922, His Excellency Lord Byng, Governor-General of Canada, established a National Park for the Preservation of the Buffalo, consisting of about 10,000 square miles, to be known as the Wood Buffalo Park. In this, the Wood Buffalo is adequately protected by the efficient Department of the Interior at Ottawa. The herds are increasing, and there is little danger of their extinction.

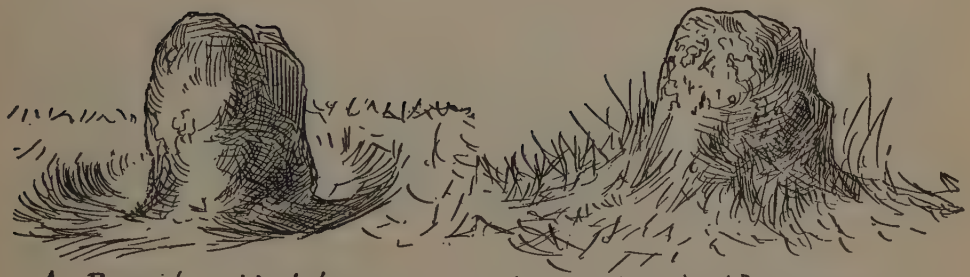
Before leaving the subject, it is well to remind scientists that in this park there are two separate herds of the Buffalo—the northern herd, which is the typical group of true *athabascæ;* and the Peace River herd, which, according to some, is between the Wood and Plains Buffalo. It is to this southern herd that the surplus from Wainwright Park is being added at the rate of 1,500 per annum, as we have seen.

Meanwhile, under permit from the Dominion Parks Branch at Ottawa, a series of specimens, skulls and skins of the Wood Buffalo are being gathered for museums; so that the scientific record shall be complete.

It is only fair to add that many scientists strongly disapprove the importation of the Wainwright Buffalo to the Wood Buffalo Park. Among

[9]Canada's Wild Buffalo, Dept. Int., 1923, pp. 8–10.





A. Buffalo-rubbed boulder B. Boulder in New England.

Plate CV. — Buffalo tracks & signs.

those who have entered vigorous protests are Dr. Francis Harper, Prof. Wm. Rowan, H. E. Anthony and many others. They forecast that it will mean the absorption and total loss of that superb subspecies, the Wood Buffalo.

The Wood Buffalo at Home

My own meeting with this forest giant was in 1907. I was on my way to the Barren Grounds, but made a side-trip from Smith's Landing to locate the Buffalo. My companion was Major A. M. Jarvis, of the Mounted Police, and our guide was Sousi Beaulieu, a French half-breed who promised to show us Buffalo, and gave me a chance to photograph them, within 36 hours of Smith's Landing.

On the afternoon of June 13th, we three left the Landing, camping at night on Salt River. On the second day, we traversed a pleasant, rolling country of poplar woods, alternated with open glades.

As we rode along, Sousi prattled cheerfully in his various tongues—English, French and Chipewyan. But his steady flow of conversation abruptly ended when, about 2 P. M., we came suddenly on some Buffalo tracks—days old, but still Buffalo tracks. All at once and completely, he was the hunter. He leaped from his Horse and led away like a hound.

Ere long, of course, the trail was crossed by two fresher ones; then we found some dry wallows and several very new tracks. We tied up the Horses in an old funnel pit and set about an elaborate hunt. Jarvis minded the stock; I set out with Sousi, after he had tried the wind by tossing up some grass. But he stopped, drew a finger-nail sharply across my canvas coat, so that it gave a little shriek, and said "*Va pa*," which is "*Cela ne va pas*" reduced to its bony framework.

I doffed the offending coat, and we went forward. First we circled a little to eastward, tossing grass at intervals; but finding plenty of new sign, went northerly and westward till most of the new sign was east of us. Sousi led off, telling me to step in his tracks and make no noise. I did so for long, but at length a stick cracked under my foot; he turned and looked reproachfully at me. Then a stick cracked under *his* foot; I gave him a poke in the ribs.

At the edge of an opening, he pointed across to the far woods, and said, "They are there." We sneaked with the utmost caution that way—it was impossible to follow any one trail—and in 200 yards, Sousi sank to the ground, gasping out, "*Là! Là! maintenant faites son portrait au tant que vous voudrez.*" I crawled forward and saw—not one, but *half a dozen* Buffalo.

PLATE CVI.—WOOD BUFFALO DRY WALLOWS—FROM LIFE

PLATE CVII.—WOOD BUFFALO HERD SKETCHED FROM LIFE

"I must be nearer," I said; and, lying flat on my breast, holding high the camera, I crawled, toes and elbows, up to a bush within 75 yards, where I made shot No. 1, and saw here that there were 8 or 9 Buffalo, one an immense bull.

Sousi now cocked his rifle. I said emphatically: "Stop! you must not fire!"—"No?" he said in astonished tones that were full of story and comment. "What did we come for?"

Now I saw that by backing out and crawling to another bunch of herbage, I could get within 50 yards.

"It is not possible," he gasped.

"Watch me and see," I replied impatiently. Gathering all the near vines and twisting them around my neck, I covered my head with leaves and creeping plants; then proceeded to show that it *was* possible. Sousi followed. I reached the cover, and found it was a bed of spring anemones on the far side of an old Buffalo wallow; and there in that wallow, I lay for a moment revelling in the sight. All at once it came to me: Now indeed was fulfilled the long-deferred dream of my youth, *for in shelter of those flowers of my youth, I was gazing on a herd of wild Buffalo.*

Slowly I rose above the cover, and took my second picture. But the watchful creatures, more shy than Moose here, saw the rising mass of herbage, or may have caught the wind, rose lightly and went off. I noticed now, for the first time, a little red calf; 10 Buffalo in all I counted. Sousi, standing up, counted 13. At the edge of the woods, they stopped and looked around, but gave no third shot for the camera.

I shook Sousi's hand with all my heart; and he, good old fellow, said fervently in French: "Ah, it was for this I prayed last night; without doubt, it was in answer to my prayer that the Good God has sent me this great happiness."

Back at camp, that night, the old man's tongue was loosed; and he told me how the chiefs in conference, and everyone at the Fort, had ridiculed him and his Englishmen—"who thought they could walk up to Buffalo and take their pictures."

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LIFE LXI—THE PECCARY

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THE BRAVE LITTLE PIGS!

Peccary, Collared Peccary, Texas Peccary, Muskhog, Wildhog, Javeline, Haveline

Pecari angulatus (Cope)

Pecari, Brazilian (*Tupi*) *pe*, path; *caa*, wood; *ri*, much, many—i. e., an animal which makes many paths through the woods. (Liais) L. *angulatus*, angular, referring to the nasal bones.

Dicotyles angulatus Cope, 1889, Amer. Nat., Feb., p. 147.
Pecari angulatus Miller, 1912, North Amer. Land Mamm., 1911, p. 383.

Type Locality—Guadalupe River, Texas.

Mexican, *Javeline*, referring to the tusks; *Moran* (Kennerley, Mamm. Mex. Bd., p. 50).
Canal Zone, *Zajino* (Goldman, Mamm. Pan., p. 73).
Guaranese, *Taytetu* (Azara, p. 122) Brazilian, *Tajacu*, given by Buffon as a native name.
All Saint's Bay, *Pelas* (Azara, p. 124).

Mayne Reid, speaking of the White-lipped species, says that in Paraguay, it is "known as the '*vaquira*,' whence our word 'Peccary.'"[1]

The Family *Tayassuidæ* consists of middle-sized, digitigrade animals, clad in bristles; teeth in both jaws, well-developed. They have the snout and general form as in the Old World Pigs; but differs from *Sus* and the other Old World genera, in having only 4 upper incisors, and only 3 premolars on each side, above and below; the incisors rooted, and the upper canines directed downward, with sharp cutting hinder edges. Their median metacarpal and metatarsal bones are ankylosed into cannon-bones; and an odorous gland occupies the top of the rump. Toes, 4 on the fore feet, and 3 on the hind feet (the 5th wanting). Tail, a mere knob. Confined to the New World.

The genus *Pecari*, Reichenbach, 1835, comprising the Collared American Pigs, has further, small size, a white collar, and many cranial peculiarities.

$$\text{Teeth: Inc.}\ \frac{2-2}{3-3};\ \text{can.}\ \frac{1-1}{1-1};\ \text{prem.}\ \frac{3-3}{3-3};\ \text{mol.}\ \frac{3-3}{3-3}=38$$

[1]Hunters' Feast, p. 114.

In addition to the generic characters, the Collared Peccary has the following:

Size and Weight. Total length, 34¼ to 40 in. (870 to 1,016 mm.); tail, ½ in. (12 mm.); hind foot, 8¼ in. (210 mm); height at shoulder, 32⅛ in. (816 mm.).

"The sexes are practically of the same size, an adult ♂ and ♀, taken from the same herd on the San Bernardino River, weighing respectively, 46 and 44 lbs. avoirdupois."[2]

Colour. In general, more or less black, plentifully peppered over on the head and back with white, caused by white bands on each stiff bristle. This gives a coarse gray effect. A whitish or tawny band or collar on each side of the neck, passes up and back nearly to the spine.

Sexes alike.

Young. "The young when newly born, are plain yellowish gray on limbs and under parts; above, brownish yellow mixed with black, with a black vertebral stripe extending from the occiput to the gland on the rump; tip of ear dusky. Sometimes the shade of colouring is decidedly reddish in young Peccaries. In growing older, the black vertebral stripe grows less conspicuous, as black gradually becomes the predominant colour of the upper surface; but the collar and pale annuli do not lose their reddish shade until the animal has nearly grown to mature size."[3]

Races

The following forms have been recognized:

angulatus Cope, the typical form. T. l., Guadalupe River, Texas.

sonoriensis Mearns, a large, grayish animal with a black dorsal stripe. T. l., San Bernardino River, Sonora, Mex.

humeralis Merriam, similar to *angulatus*, but sides grayer; head, yellower; dorsal black band, more strongly marked, almost as sharply as in *sonoriensis* from Arizona; shoulder stripes, yellowish fulvous. T. l., Armeria, Colima, Mex.

crassus Merriam, a very large, pale form. T. l., Metlaltoyuca, Puebla, Mex.

yucatanensis Merriam, a small pale form. T. l., Tunkas, Yucatan, Mex.

crusnigrum Bangs, a remarkably dark, richly coloured animal with tawny shoulder stripes. T. l., Boquete, Chiriqui, Panama.

[2]Mearns, Mamm. Mex. Bd., p. 167.

[3]Mearns, Mamm. Mex. Bd., p. 161.

nanus Merriam, a very small dark species. T. l., Cozumel Island, Yucatan, Mex.

bangsi Goldman, a dark form similar to but paler than *crusnigrum*. T. l., Boca de Cupe, eastern Panama.

Range and Haunts

The northern range of the Collared Peccary in North America nearly coincides with the northern boundaries of the Lower Sonoran Fauna. Its north limit is a little short of this now, though formerly it reached the Red River in Arkansas. Southward, it extends through Central America, into South America, as far as Patagonia.

The two quite distinct areas which it inhabits north of the Mexican border—namely, southern Texas and southern Arizona with a corner of New Mexico—have each a distinguishable and peculiar form of Peccary, separated by the high backbone of Mexico, which forms a long dagger of Upper Sonoran and higher faunal zones between them.

In Texas, within the confines of their geographical life-zone, Peccaries are usually found in the forests; and prefer low and marshy grounds, as does the common Hog. They wander wherever they can find a supply of food. Often they enter the fields of the planters, and commit great depredations on their crops.

In Southwestern Texas, however, according to Mearns, "they prefer rocky walls of canyons and the vicinity of streams or hilltops where caverns and hollows afford protection, to which they retire during midday. On Las Moras Creek, in Kinney County, Texas, they often join herds of domestic Swine, feeding on roots, acorns and pecan nuts in company with the half-wild Pigs known as 'Razor-backs.'"[4]

West of the divide, according to the same authority, "on the San Luis Mountains, they were found from the lower edge of timber up to the highest summits, as well as on those parts of the surrounding plains and playas where the nolinas, mesquites and mimosas grew abundantly."[5]

Thus, in northern Mexico, southern Arizona, and southern New Mexico, they are equally at home among scattered growth of low, dense cactus and chaparral, on plains, in the rocky foothills, or among the dense swampy undergrowth of river bottoms—apparently indifferent to their surroundings, so there be a measure of cover, and plenty of food.

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[4]Mamm. Mex. Bd., p. 162.

[5]As above, p. 166.

In tropical America, they inhabit the jungles and dense forest undergrowth from the lower levels, well up on the slopes of high mountains.

On the home range of the family, there is no complete evidence. One often hears the phrase, "There is a herd of Muskhog living in that thicket"; implying that this is their home, and that they can be found in it at any time. It seems certain that, although they have one place for sleeping and others for feeding, these are never far apart. Evidently these interesting little Hogs are possessed of a home love incompatible with far travelling.

Numbers

In the palmy days of the '50's and '60's—yes, even as late as the early '80's—Peccaries abounded in much of Texas; and were particularly plentiful in the southern part of the State, where low, dense thickets covered much of the country. Then came the Destroyer, the sordid white man with his destructive weapons. The territory of the little Pigs rapidly shrank.

"On Silver Creek, in southeastern Arizona," says Mearns in 1892, "these animals are periodically abundant, and many have been killed by hunting parties from the old post (now abandoned) of Fort Bowie."[6]

In April of the same year, Col. Theodore Roosevelt made a trip after Peccary along the Frio River, near Uvalde, Texas, and wrote as follows:

"There had been many Peccaries, or as the Mexicans and cowpunchers of the border usually call them *Javalinas*, round this ranch a few years before the date of my visit. . . . Many anecdotes were related to me of what they had done in the old days when they were plentiful on the ranch. They were then usually found in parties of from 20 to 30, feeding in the dense chaparral."[7]

In 1892–93, when Dr. E. A. Mearns was on the Mexican Boundary Survey, he wrote: "Though greatly reduced in number, Peccaries are still common in southwestern Texas.[8] "Peccaries abound in the Pajarito Mountains and at La Osa, Pima County, Arizona."[9] "They were abundant at Pozo de Luis, Sonora, where they usually frequented rocky hills. Their tracks and wallows were seen everywhere about the base of the mountains."[10]

These, however, were scattered localities. Taking the region all to-

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[6]Mamm. Mex. Bd., p. 167.
[7]Wild Hunt., pp. 350–51.
[8]Mamm. Mex. Bd., p. 162.
[9]As above, p. 168.
[10]As above, p. 168.

gether, "On the whole, Peccaries were not abundant on the boundary strip."[11]

But this was 30 years ago. We must now write the customary melancholy summing up: Formerly abundant within our borders, now practically extinct.

In Mexico, things are not quite so bad; the little Muskhog is still found plentifully in many regions. And farther south, in Central America, it is said to be nearly as plentiful as 50 years ago. In the Panama Canal Zone, according to Goldman, it is well known as the "Zajino" and doubtless ranges in the forests throughout the Republic. "Although occurring in much smaller herds than the White-lipped Peccary, it is more frequently met with, and seems to exceed that species in numbers. Parties of 5 or 6 to 12 or 15 individuals are not uncommonly met with; and lack of time to devote to the species, alone prevented me from securing a large series of specimens.

"A few small tracks and the depressions left where these Peccaries have been rooting or wallowing in mud, may often be seen in isolated parts of the forest. Fresh Peccary work was seen nearly every day not far from camp in the forest at about 800 feet on the basal slope of Cerro Azul; but I did not see any of the animals, probably owing to their becoming alarmed at shots frequently fired at other game."[12]

The Epoch of Slaughter

The extirpatory destruction began, of course, when the white man came into full possession. William P. Smith reported from Texas in 1833: "From 5 to 15 planters together, and occasionally a larger number of hunters, would join in the pursuit of these ravagers of their cornfields, in order to diminish their number and prevent their further depredations, as at times they would nearly destroy a farmer's crop. Since this time, however, their number has greatly decreased, and it is now a difficult matter to find them."[13]

Roosevelt thus sums the story of the mop-up in Texas: "Until 1886, or thereabouts, these little Wild Hogs were not much molested, and abounded in the dense chaparral around the lower Rio Grande. In that year, however, it was suddenly discovered that their hides had a market value, being worth 4 bits—that is, half a dollar—apiece; and many Mexicans and not a few shiftless Texans went into the business of hunting them as a means of livelihood. They were more easily killed than Deer, and, as a result, they

[11]Mamm. Mex. Bd., p. 168.
[12]Mamm., Pan., p. 73.
[13]Quoted by Bachman. Q. N. A., I, p. 238.

PLATE CVIII.—COLLARED PECCARIES

From drawing by E. T. Seton, 1898

Loaned by the New York Zoological Society

were speedily exterminated in many localities where they had formerly been numerous; and even where they were left, were to be found only in greatly diminished numbers."[14]

His Use of the Musk

The Musk Gland and the Tail. Even the earliest observers of the Peccary seem to have been impressed chiefly by the musk gland on the small of the creature's back. Thus:

Lionel Wafer's observations, made in 1681, are quoted as follows: "The Country [Panama] has of its own a kind of Hog, which is called *Pecary*, not much unlike a Virginia Hog. 'Tis black, and has little short Legs, yet is pretty nimble. It has one thing very strange that the Navel is not upon the Belly, but the Back: And what is more still, if upon killing a Pecary the Navel be not cut away from the Carcass within 3 or 4 hours after at farthest, 'twill so taint all the flesh, as not only to render it unfit to be eaten, but make it stink insufferably. Else 'twill keep fresh several days, and is very good wholesome Meat, nourishing and well tasted."[15]

"Wafer evidently mistook the dorsal gland for the navel. As stated by him, the part is removed as soon as possible after the animal is killed, and should not be allowed to touch meat intended for food."[16]

Similarly, Azara, who wrote 1783 to 1796, concerning the two Peccaries: "They have, moreover, upon the back, and above the buttocks, what in this country is called *catinga*, that is, a gland whence flows a liquor like thick serum, which has a disagreeable smell in the first species [*T. pecari*], although I found it agreeable and like sweet musk in the second [*P. angulatus*]."[17]

Both sexes bear this scent-gland. It is situated on the pelvis about 8 inches above the knob of a tail; and, like all such, is primarily a deep fold in the skin. It is about 2 inches in diameter, and half an inch thick. The musk is, at times, very strong, and has evident affinity with that produced by Muskdeer and by Skunk.

These musk-glands are usually developed as part of a signal system, as in Deer, Antelope, and Wolves; and there can be no doubt that as such they serve the Peccary. Chapman Grant expressly says that the musky odour enables the young to find and follow the mother. Also that "habitu-

[14]Wilderness Hunt., p. 350.

[15]A New Voyage and Description of the Isthmus of America (1699); 3d edition, quoted here, 1729, p. 328.

[16]Goldman, Mamm. Pan., p. 73.

[17]Quad. Para., p. 116.

ally, the boars rub their backs on low limbs to leave their trade mark behind, and thus mark out their range."[18] The habit is nearly universal among animals, and is discussed in more than one of these Lives. This is using the musk as a property mark.

Finally—and this also has many precedents—certain emanations are a warning to the rest of the herd,—a crude but tremendously effective mode of communication between the different members of the clan, between the pairs, and between the parents and young. It also serves as a means of expression. William P. Smith pointedly states that the "odour is emitted whilst the animal is excited."[19]

Chapman Grant says: "One moonlight night, I walked into a herd of sleeping Peccaries which started up with grunts, snorts, and a clicking of tusks. A wave of musk of great intensity arose, and spread so quickly that I feel sure that it literally must have been forcibly ejected from the glands."[20]

But in their highest specialization, the musk-glands become weapons of defense, as in the Skunk, the Weasels, the Teledu of Java, and maybe, also, in the Muskdeer, the Muskox, and in the present, the Muskhog, as we shall see.

Apparently correlated with this skin-gland in some cases, are the size and use of the tail. The tail, in animals, is notably variant in function. It may be developed for a club as in the alligator; for a hand, as in the Possum; for a parachute, as in the Gray-squirrel; for a comforter, as in the Fox; for a wigwag signal, as in the Whitetailed Deer; for a fly-flapper, as in the Buffalo. Or it may be dispensed with altogether; that is, reduced to a mere knob, as in the Muskox, the Muskdeer, and the Muskhog.

At once, we are struck by the similarity of the last three cases. These animals live in regions where mosquitoes abound. A fly-flapper tail would surely be useful. Each has near relatives to whom the tail serves as a fly-flapper; yet each has given up its tail and evolved instead a penetrating musk. By all the rules of the game, this musk ought to be an effective mosquito repellent. It may be so; but at present, there is little or no evidence to prove—or to disprove it.

It is quite certain, at least, that the musk is no protection against ticks. Azara says of both species of Peccary:

"They are commonly covered with ticks (*garrapatas*) which fasten on them in the woods."[21]

[18]Big Game, p. 1387.
[19]Q. N. A., I, p. 239.
[20]Big Game, p. 1387.
[21]Quad. Para., pp. 115–16.

Flesh. All observers agree that the musk-gland should be cut off at once after the animal is killed; or in a single hour it gives the meat so strong a taint that it cannot be eaten. With this precaution observed, the flesh of the Peccary is used, and generally prized for food. According to De la Borde:

"Their flesh has an excellent taste, but is not so tender as that of the domestic Hog; it resembles the flesh of the Hare, and has neither lard nor grease."[22]

William P. Smith, who went to Texas in 1841, collecting wild animals, says: "The flesh of the female is good at some seasons of the year but that of the male is strong, coarse and disagreeable at all times."[23]

In similar vein, Chapman Grant writes: "The flesh of a young sow is delicious food, but that of the older animals, or the boars, is very musky and not fit for food. The musk-sac must be removed from the animal as soon as it is killed, if the flesh is to be eaten."[24]

Hunting the Peccary

There is little of interest to offer in a chapter on hunting this game little Hog. Azara—to go to the beginning of Peccary history—says: "In capturing them, the natives observe the paths they take, and forming a long hedge of branches on either side with a deep pit at the end, they frighten them by hallooing and other noises, and drive them onwards towards the ditch, which is generally filled with them."[25]

Wm. P. Smith, who set out to capture Peccaries on the Brazos River, Texas, in 1841, says of two that had their nest in a hollow log: "Being late in the day, I was determined not to disturb them till a more favourable time would present itself, as I was anxious if possible, to procure them alive. Some time passed, and everything being ready, the Dogs soon compelled them to make for home, when, they having entered, we secured the entrance of their hole, and cut a large opening up the body of the tree, a few feet above them, from which 'point of vantage' we were enabled easily to drop a noose round their necks, which we tightened until we thought they were nearly suffocated. We then drew them out, tied their legs and feet securely, and fastened their mouths by binding their jaws together with cords, and then left them lying on the ground."[26]

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[22]Quoted in Q. N. A., I, p. 237.
[23]Q. N. A., I, p. 239.
[24]Big Game, p. 1386.
[25]Quad. Para., p. 119.
[26]Q. N. A., I, pp. 238–39.

Roosevelt writes thus of the last band that lived on the Frio River where he hunted in 1892:

"On this particular Frio ranch, the last little band had been killed nearly a year before. There were 3 of them, a boar and two sows; and a couple of the cowboys stumbled on them early one morning while out with a Dog. After half a mile's chase, the three Peccaries ran into a hollow pecan tree; and one of the cowboys, dismounting, improvised a lance by tying his knife to the end of a pole, and killed them all."[27]

Final illustrative paragraphs are supplied by Chapman Grant thus:

"I found a little Negro who killed his Peccaries with a penknife! The Dog would seize the Pig by one ear and hold on until our hero ran up, seized Piggy by the other ear and cut his throat.

"Peccaries cannot be hunted with a jack-light, as Deer are *illegally* hunted, because their eyes do not shine. Their eyes are small, and possibly the Pigs have more sense than to stare at a strange light.

"The Peccaries of the Texas border were nearly exterminated some years ago by hide-hunters who used Dogs."[28]

"It will not be long," he says, "before Peccaries are exterminated throughout the partially settled country, because they are easily followed by Dogs; and they have a fatal failing for going over their old range despite the changes wrought by man. Thus it is not unusual to see a band passing through a yard, or even a camp of soldiers."[29]

The Sociable Little Peccary

This happy little Hog is eminently sociable and gregarious. It is usual to see 15 to 20 or 30 together in one band; although, according to Azara,[30] it goes in "smaller troops" than its White-lipped kinsman. Sometimes the warcry of the old leader, grandma or grandpa, will conjure up an army of a hundred, ready to fight to a finish on behalf of any one of their own tribe. This is nearly an ideal association.

Nelson considers that the leader is usually "the oldest and most powerful boar."[31]

Gregarious animals are such as go in flocks—for example, Caribou—which are merely large groups of separate individuals. Sociable animals are those that unite their efforts for some common cause, and have a sort of

[27]Wild. Hunt., p. 351.
[28]Big Game, p. 1387.
[29]As above.
[30]Quad. Para., p. 119.
[31]W. A. N. A., p. 448.

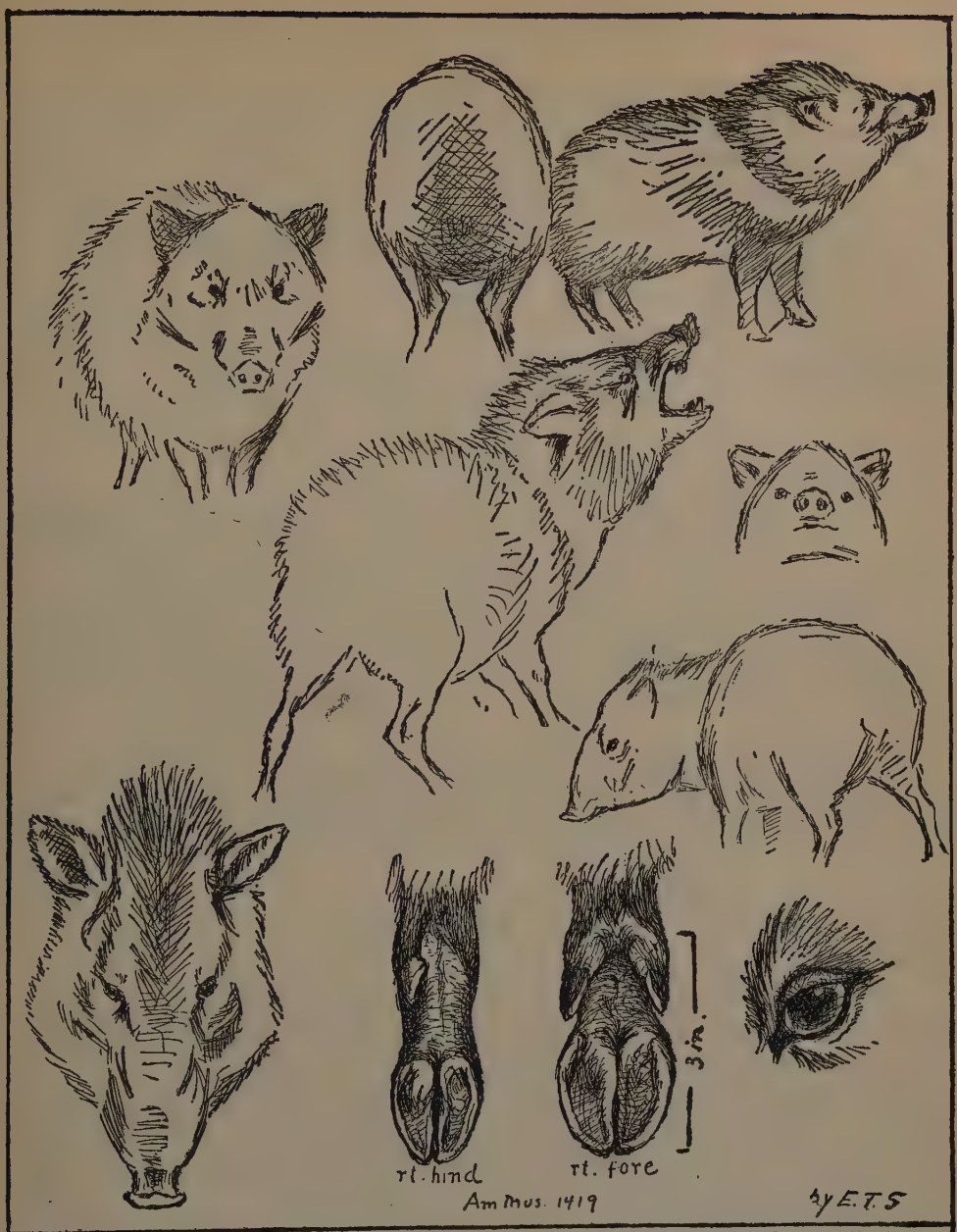

Plate CIX. — Details of Collared Peccary

organization. The Peccary is a good example of the latter. The leadership of the wise old grandparent has already been noted. The rally of the tribe to protect any single member has often been described; the methodic apportioning of the feeding grounds, and the fact of regular dormitories for the band, are well known. The climax of animal organization is intimated in this paragraph from Roosevelt's "Wilderness Hunter" (p. 351):

"At night," he says, "they sometimes lay in the thickest cover, but always where possible, preferred to house in a cave or big hollow log; one invariably remaining as a sentinel close to the mouth, looking out. If this sentinel were shot, another would almost certainly take his place."

His Private Life

Mating. No one seems definitely to know the mating customs of the Peccary. The analogy of other gregarious animals would point toward polygamy. Nevertheless, Azara definitely states that at times they "go in pairs."[32] and a possible ray of light is found in the incident given by Roosevelt, in which the last band that lived on the Frio River consisted of a male and 2 females. However, the sexes are alike, which points to monogamy.

This much is known: Mating takes place at any time. Being in a warm climate without anything of the nature of winter, as we understand it, the happy Peccary worries not at all about the weather, but merrily makes love the whole year round.

Gestation. In the common Pig, gestation lasts 112 to 116 days. In the Peccary, its duration is not known, but probably it is a little less, for he is a smaller animal.

Young. Even as far back as Azara's day (1783), it was known that the Peccary breeds but once a year, and has 2 young at most in a brood; sometimes only one.[33]

The twins arrive at any season, as already noted; and are clad in a curious reddish hair quite unlike that of the parents—more like that of the African species, who may, by virtue of this fact, be accounted in some sort its kinsfolk.

Domestic Pigs begin to follow the mother when 2 or 3 days old; so we may assume that somewhat the same habit holds among the Peccaries. It is, however, more than likely that the mother brings the young back to the nest for many nights after they are able to follow. It is known to be

[32] Quad. Para., p. 119

[33] As above, p. 118.

the habit of this interesting creature to sleep in a hollow log; and further, it has always shown strong homing instincts.

There is evidently a time when the little red Piglings follow the black mother back to the herd. This coming-out party must be when they are very young—maybe less than a month old—for often they are seen among their big brunette relatives when there still is a great difference in size.

At Home

The Peccary, unlike most of the hoofed animals, sleeps in some sort of a den, and habitually takes refuge in a hole.

De la Borde, quoted by Bachman, states that "when pursued, they take refuge in hollow trees or in holes in the earth dug by the Armadilloes. These holes they enter backwards and remain as long as they can. But when highly irritated, they instantly issue out in a body."[34]

Now, if it be not presumptuous, I should like to rewrite that paragraph, and say: "Peccaries commonly take refuge in such underground burrows as they can find, entering backwards. Here they hide until they can no longer stand the various provocations of the enemy; then come forth fighting mad."

The nest for the young is commonly in just such places, a hollow log being most often chosen.

So far as known, its nursery habits are much like those of the common Pig. Having selected a hole or lair, it prepares in it a nest. Smith further points out[35] that the creature has many sleeping places besides this nursery.

His Daily Fare

Now that the mother and her red-headed twins are back with the clan, the question of food is the most important one in the new young lives.

Audubon and Bachman give the earliest good account of the food habits in Texas, as follows: "This species feeds on fruits, seeds and roots; and, like the domesticated Hog, is constantly rooting in the earth in quest of worms, insects, reptiles, or bulbous roots. It is also said to devour eggs of alligators, turtles and birds; and to be destructive to lizards, toads and snakes. In fact, like the common Hog, it is omnivorous, feeds upon everything that comes in its way, and is not particularly choice in the selection of its food."[36]

To this Smith adds: "Their principal food consists of nuts of every

[34] Q. N. A., I, p. 237.
[35] As above, I, p. 238.
[36] As above, I, p. 237.

description (mast) during winter; but in summer they feed on succulent plants, with which the bottom lands in the Brazos abound."[37]

Bachman continues: "It appears to prefer Indian-corn, potatoes, bread and fruits; but, like the domestic Hog, evinces no unwillingness to take any kind of food that is presented to it. We remarked, however, that it is decidedly less carnivorous than the common Hog."[38]

Chapman Grant writes: "They root for their food, which seems to be principally vegetable, although grubs also undoubtedly are eaten. Cactus, or nopal, forms a considerable portion of their diet, as it does of the Deer, Woodrats and other animals."[39]

E. W. Nelson sums up their diet habit as follows: "They are omnivorous, feeding on everything edible, from roots, fruits, nuts, and other vegetable products to reptiles and any other available animals. They are specially numerous in many tropical forests where wild figs, nut palms, and other fruit-bearing trees provide abundant food. In the arid northern part of their range, dense thickets of cactus and mesquite afford both food and shelter. Their presence in a locality is often indicated by the rooted-up soil where they have been feeding."[40]

When He Meets a Rattlesnake

A very early observation on the food habits of the Peccary is furnished by that delight of my boyhood, Capt. Mayne Reid. Sometimes this good old pioneer romanced a little, but he knew the facts; and this he evidently wished to have accepted for fact as he wrote it. He opens the scene by describing a rattlesnake in a thicket, right in the line of march, that had evidently been selected by an approaching band of Peccaries.

"The rattlesnake, on seeing the first one, had laid his head flat upon the ground; and evidently terrified, was endeavouring to conceal himself in the grass. But it was a smooth piece of turf, and he did not succeed. The Peccary had already espied him; and upon the instant, his hinder parts were raised to their full height, his mane became rigid, and the hair over his whole body stood erect, radiating on all sides outward. The appearance of the creature was changed in an instant, and I could perceive that the air was becoming impregnated with a disagreeable odour, which the incensed animal emitted from its dorsal gland. Without stopping longer than a moment, he rushed forward, until he stood within three feet of the body of the snake.

[37] Q. N. A., I., p. 239.
[38] As above, p. 240.
[39] Big Game, p. 1387.
[40] W. A. N. A., p. 448.

"The latter, seeing he could no longer conceal himself, threw himself into a coil, and stood upon his defense. His eyes glared with a fiery lustre; the *skir-r-r* of his rattles could be heard almost incessantly; while with his upraised head he struck repeatedly in the direction of his enemy.

"These demonstrations brought the whole drove of Peccaries to the spot, and in a moment a circle of them had formed around the reptile, that did not know which to strike at, but kept launching out its head recklessly in all directions. The Peccaries stood with their backs highly arched and their feet drawn up together, like so many angry Cats, threatening and uttering shrill grunts. Then one of them, I think the first that had appeared, rose suddenly into the air, and with his 4 hoofs held close together, came pounce down upon the coiled body of the snake. Another followed in a similar manner, and another, and another, until I could see the long carcass of the reptile unfolded, and writhing over the ground.

"After a short while, it lay still, crushed beneath their feet. The whole squad then seized it in their teeth, and tearing it to pieces, devoured it almost instantaneously."[41]

The Brave Little Peccary

In those glorious books that contributed so much to the joy of our youth—those books that made the atlas the favourite among our school equipment, because its ample covers hid what we really were reading—those books that brought a gleam of surreptitious joy into even the sad slavery of the school hours—the Peccary was painted as the embodiment of heroism, a small fierce little creature of such perfect organization and so valiant a soul, that no beast in his woods dared molest him; and even man was wary of attacking, unless in a safe, high place, and supplied with plenty of ammunition.

Capt. Mayne Reid and George Catlin were chiefly responsible for these happy dreams; but there were hosts of lesser witnesses. And the Peccary stood enshrined among our animal heroes—the embodiment of valour, without fear, without reproach.

Then came the inevitable reaction. The iconoclast—which is Greek for the "sneerer"—saw his chance. Good sneers, humiliating, pungent, acrid sneers were joyfully possible; and this, for example, we found in perfectly respectable print:

"Tales of the ferocity of bands of the Collared Peccaries and of their treeing hunters who have disturbed them, read well to the novice, but have

[41]Hunters' Feast, pp. 121–22.

little foundation in fact. In reality, the animals are shy and retiring, and fight only when forced to do so for self-protection."

Yes, I know I'm a novice. I never saw a wild Peccary in my life; and, much as I longed for it, I never was treed. Those lovely heroic stories did read well to me.

Now, see here, I've given up my King Arthur, I've given up my William Tell, I've given up my Robin Hood. But I will *not* give up my Peccary.

I have looked around for help, for supporters, for the making of an army; and I have found some invincibles. I array them now, and defy the Greek sneerer:

First the immortal Audubon, talking of Peccaries says: "When attacked by the Jaguar, the Puma, the Wolf, the Dog, or the hunter, they form themselves into a circle, surrounding and protecting their young, repelling their opponents with their sharp teeth, and in this manner sometimes routing the larger predatory animals, or severely wounding the Dogs and the hunters."[42]

W. P. Smith, who lived with Peccaries in the '40's, says: "This animal, which in Texas is always called the Wild Hog, is considered the bravest animal of these forests, for it dreads neither man nor beast."[43]

In the early days of Texas (1833), this same naturalist continues: the Peccary "struck terror into the hearts of the settlers in their vicinity, oftentimes pursuing the planter whilst hunting or in search of the lost track of his wandering Cattle—at which time they frequently killed his Dogs, or even at times forced him to ascend a tree for safety, where he would sometimes be obliged to wait until the Hogs got tired of dancing attendance at the foot of his place of security, or left him to go and feed. These animals appeared quite savage, and would, after coming to the tree in which the planter had ensconced himself, snap their teeth and run about and then lie down at the root of the tree to wait for their enemy to come down."[44]

Mearns, who knew so much about Peccaries that he could make two species out of one, relates that "the late Major Charles E. Bendire shot Peccaries during the period from 1857 to 1859, near the spot where Lieut. [Howard B.] Cushing, of the Third Cavalry, was killed by Indians in the Whetstone Mountains of Arizona, and also in the Chiricahua Mountains, and near the old mission of San Xavier, in the Santa Cruz Valley. At the latter place, the major witnessed an amusing incident—the treeing of a Negro servant by a band of infuriated Peccaries. Although stories of

[42] Q. N. A., I, pp. 236–37.
[43] As above, p. 239.
[44] As above, p. 238.

similar occurrences are commonly repeated by the white settlers of the Southwest, this is the only instance of an attack made on man by Peccaries, that has come to me on unimpeachable evidence."[45]

Roosevelt, the intrepid, writes that the Peccaries "were subject to freaks of stupidity, and were pugnacious to a degree. Not only would they fight if molested, but they would often attack entirely without provocation.

"Once my friend, [John] Moore himself, while out with another cowboy on horseback, was attacked in sheer wantonness by a drove of these little Wild Hogs. The two men were riding by a grove of live-oaks along a wood-cutter's cart track, and were assailed without a moment's warning. The little creatures completely surrounded them, cutting fiercely at the Horses' legs and jumping up at the riders' feet. The men, drawing their revolvers, dashed through and were closely followed by their pursuers for 300 or 400 yards, although they fired right and left with good effect. Both of the Horses were badly cut. On another occasion, the bookkeeper of the ranch walked off to a water-hole, but a quarter of a mile distant, and came face to face with a Peccary on a Cattle trail, where the brush was thick. Instead of getting out of his way, the creature charged him instantly, drove him up a small mesquite tree, and kept him there for nearly two hours, looking up at him and champing its tusks."[46]

Those who wish to read a story of animal heroism that will thrill them, are advised to see Wheeler's "Battle with Wild Hogs." It is the story of an Arizona Peccary hunt. I wish I could give it in full here. I rejoice in it as far as it was a Peccary victory—dear-bought, but still a victory. The way in which those brave little Pigs sliced up that big, loud-mouthed Dog, carefully bred for ferocious fighting—the way in which they punished that hunter, in spite of his repeating rifle, gives me some of the same satisfaction that one feels on reading the story of Leonidas's hard-won victory at Thermopylæ. (See References.)

Chapman Grant, one of the latest authorities, says: "There are many stories current of the ferocity of these little Pigs. Many hunters claim that they are dangerous, and attack when wounded or to protect their young. Close inquiries fail to elicit authentic information of any one actually being hurt by them, but numerous stories prevail of hunters being treed by infuriated Peccaries."[47]

And again this same sportsman says: "Judging by the rapidity with

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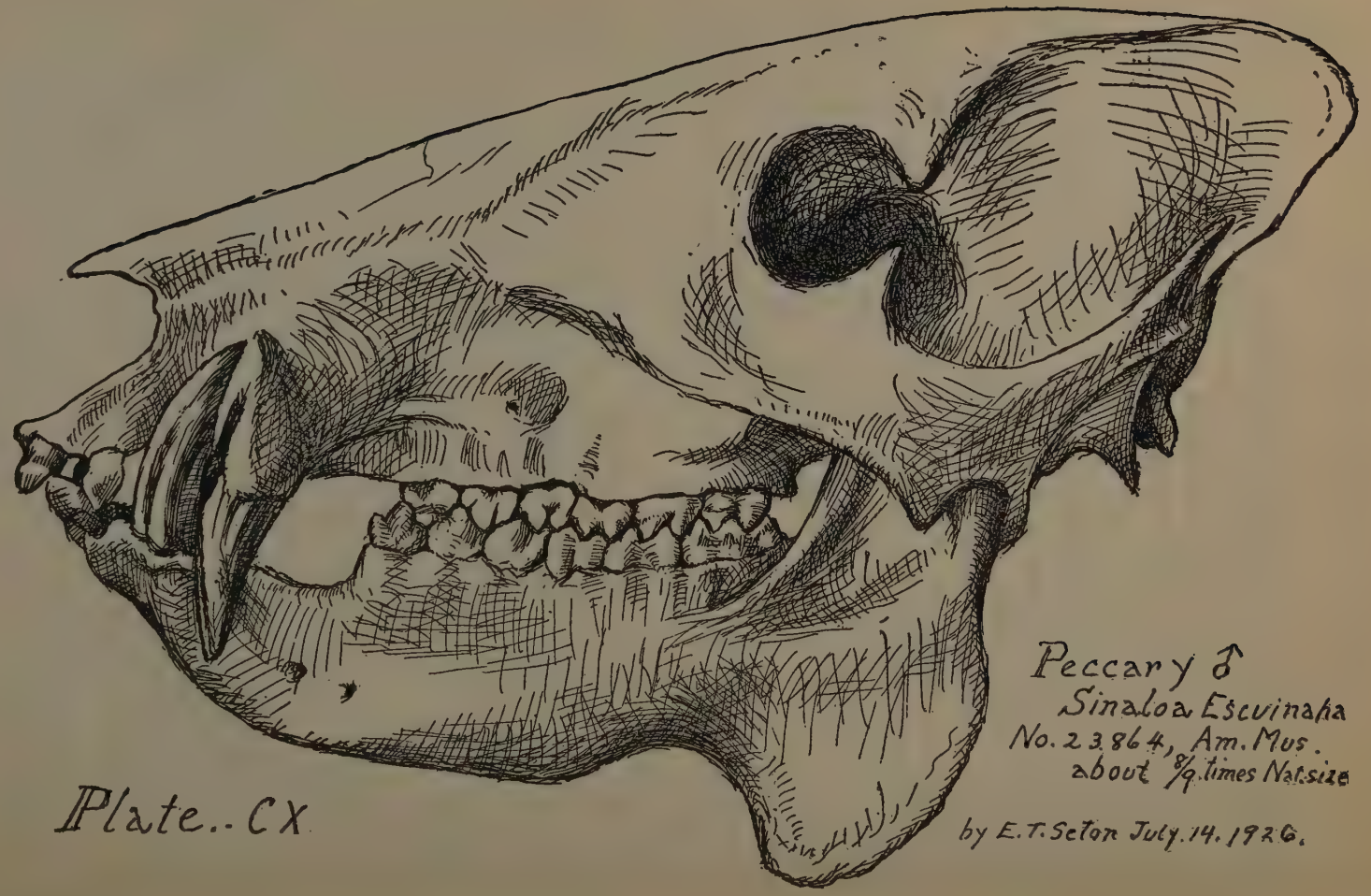
[45]Mamm. Mex. Bd., p. 167.
[46]Wild. Hunt., pp. 351–52.
[47]Big Game, p. 1386.



Peccary ♂
Sinaloa Escuinapa
No. 23864, Am. Mus.
about 8/9 times Nat. size

by E. T. Seton July. 14. 1926.

Plate.. CX

which these little Pigs can travel through the brush, I believe it would be very difficult for an active man to climb a tree, even were one right at hand, before being overtaken. I have shot Peccaries, and had a bunch of from 5 to 15 scurry past me under the brush in open formation. Those that passed near by, would see me, and snap their tusks and raise their manes; and I believe that this helter-skelter scurry for safety is often mistaken for a charge, when really the little Pigs are merely running in the direction in which they were headed when startled. I am positive that I could not successfully have escaped by climbing a tree had they really been after me."[48]

In short, each writer begins by belittling the courage of the Haveline; then admits that they are dangerous and desperate enemies if any one declare war on them by threatening or injuring one of the clan.

The Case Against

Now let us array the testimony of the other side. First and oldest, Azara, says:

"It is also asserted that this species, if offended, will unite together, and surround man and Dogs, and tear them to pieces, should they not succeed in escaping by flight, or by climbing a tree: I believe this, that however generally reported, to be a gross exaggeration; for I have frequently hunted them with Dogs and servants, and have never observed that they made use of any means of defense save that of flight."[49]

Similarly Mearns aspersively relates: "I have met with bands of Peccaries on a few occasions when some of them were shot. They were always wild and shy, exerting themselves to the utmost to escape, and paying no attention to the unfortunate ones that were killed or wounded. In one instance, when hunting in the Cobota Mountains, Sonora, in company with Lieut. William H. Bean, of the Second Cavalry, I wounded a female Peccary standing in the midst of a drove of them with her young beside her. Although she squealed loudly, the remainder of the band rushed off and left her. A moment later, we came upon her among the bushes and cacti, but she arose and escaped from us without attempting to defend her young, which were no larger than Cottontail Rabbits."[50]

Leaving out the whole question of individual variation which makes it so dangerous, yes, futile, to found a generalization on one or two instances, it should be remembered that a hundred years ago, the Gray-wolf was danger-

[48]Big Game, p. 1386.
[49]Quad. Para., p. 118.
[50]Mamm. Mex. Bd., p. 167.

ous to man; but, having learned the lesson of guns, their invincibility, their irresistible, inevitable destructiveness, he has become the shyest of wild things.

It seems that some such explanation exactly applies here. In the old and early days, the Peccary was a fearless desperado, defiant of any creature, even man. Now he has seen the light; new weapons have made a very different problem! To fight is suicide indeed. The Peccary is wise as he is valiant, and he now adopts the only course that promises safety. In support of this view, I quote from Azara:

"Mons. De la Borde[51] relates that 'they are easily shot; for instead of flying, they assemble together, and often give the hunters an opportunity of charging and discharging several times.' He mentions 'that he was one day employed, along with several others, in hunting these animals, accompanied by a single Dog which, as soon as they appeared, took refuge between his master's legs. For greater safety, he with the other hunters stood on a rock. They were nevertheless surrounded by the herd of Hogs. A constant fire was kept up, but the creatures did not retire till a great number of them were slain.' '*These animals however*,' he remarks, '*fly after they have been several times hunted.*'"[52]

The italics are mine, because, in that sentence, I see a way to reconcile the clashing testimony of so many reliable witnesses. And Roosevelt concludes his Peccary chapter with a similar statement. "In the old days, it had been no uncommon thing for a big band to attack entirely of their own accord, and keep a hunter up a tree for hours at a time." But now they were reduced to a remnant "and the survivors were learning some caution."[53]

The Wise Little Peccary

Through the intimate descriptions of naturalists who have followed the valiant Peccary in many of the stress-times of his life, we have learned that he can change his ways to meet changing conditions. Now we can learn, through testimony, that this happy little Hog, brave as a Lion, can be wise as a serpent.

Says Mearns: "It is only by accident that they are discovered in their retreats during the middle of the day; but at morning and evening, herds of them may be seen feeding in the open. . . . Although signs of Peccaries were abundant in an extensive area of oak scrub (*Quercus emoryi*) around Monument No. 64, at timber line of the east base of the San Luis Mountains,

[51] D'Azara, Quad. du Para., I, p. 31.
[52] Q. N. A., I, p. 237.
[53] Wild. Hunt., p. 360.

the creatures were so clever at hiding that none could be seen, although we frequently came so near them that their peculiar odour was very evident."[54]

The Friendly Little Peccary

He will associate freely with the common Hog, but will not hybridize with it.

Another pleasant friendship is thus outlined by Chapman Grant: "White-tailed Deer seem to get along amicably with their small neighbour, the Collared Peccary, or 'Jabeline,' . . . as I have seen 8 or 10 Deer feeding among a bunch of possibly 20 Peccaries in thorn brush."[55]

According to all testimony at hand, the Peccary, if taken young, is easily tamed, and becomes a delightful and intelligent pet. Chapman Grant says:

"If taken and raised on a bottle, they become affectionate pets, and later develop into very jealous and ferocious watchdogs; but for the safety of strangers they must be killed or confined when a couple of years old."[56]

Bachman says: "We have frequently seen the Collared Peccary in confinement. One that is at present (1846) in a menagerie in Charleston, is exceedingly gentle, taking its food from the hand, and allowing itself to be caressed even by strangers. It lies down in the manner of a Pig, and next to giving it food, the greatest favour you can bestow on it is to scratch it either with the hand or a stick. It, however, is easily irritated. We noticed that it has a peculiar antipathy to the Dog, and when approached by that animal, immediately places itself in a defensive attitude, raising its bristles, showing its tusks, stamping its feet, and uttering a sharp cry which might be heard at the distance of 70 yards. When in a good humour, however, it occasionally utters a low grunt like a Pig. It seems to suffer much from cold, and is always most lively and playful on warm days."[57]

Mearns tells of sundry tame Piglets that he met: "At the La Osa ranch Mrs. W. S. Sturges had several as pets that had been presented when very young by Papago Indians whom she had befriended. They became gentle and affectionate if not maltreated; but exceedingly vicious if teased and hurt. One that I bought from a Mexican lad was fondled and kissed by its owner, who parted from it with tears. It followed us about in the camps, where, from its habit of rubbing against one, it received several hard kicks from frightened teamsters at night, which wrought such a change in its previ-

[54] Mamm. Mex. Bd., p. 167.
[55] Big Game, p. 1386.
[56] As above, p. 1387.
[57] Q. N. A., I, pp. 239–40.

ously friendly disposition that no one could safely approach it, on which account I was obliged to send it to the National Zoological Park, where it became tractable."[58]

A particularly joyful picture is presented by E. W. Nelson. "Young Peccaries," he says, "become very tame and make most intelligent and amusing pets. One moonlight night on the coast of Guerrero, two of us, after a bath in the sea by a small Indian village, strolled along the hard white sand to enjoy the cool breeze. Suddenly a little Peccary, not weighing over 8 or 10 lbs., came running to meet us, and after stopping at our feet to have its head scratched, suddenly circled about us, away and back again in whirling zigzags, with all the joyous frenzy of a playful puppy. Continuing this performance, it accompanied us for several hundred yards, until we returned to the village."[59]

It is, of course, the final proof of domestication, when the creature is not only tame and tractable, but also breeds in captivity. Bachman says of those that he observed:

"The Collared Peccary is easily domesticated, and breeds readily in confinement. We saw a pair on board of a ship that arrived in Charleston from South America, the female of which had produced 2 young whilst on the passage; they were then several weeks old, and seemed to be in a thriving condition."[60]

"We observed at the Zoological Gardens in London, young Peccaries that had been born in the menagerie."[61]

His Way of Life

The big boar is bossing the herd. His wisdom is not merely his own; but, accumulated in his small brain, is all the inherited wisdom of his forbears, manifested as guiding instincts.

One of the elegant young lady-Pigs has been absent for some time. Each day she has been back for a spell—back in society. But the last day or two, she has been wholly out of sight till now. The herd has been rooting out vegetable delicacies, varied with grubs and beetles, and are nearly ready to head for the drinking place before settling for the noon sleep that every Muskhog takes during the heated hours—when back comes the lady-Pig; not alone this time, but followed by two funny little red roasters, not so big as Rabbits, but quick to run, and careful to stay right next their mother.

[58]Mamm. Mex. Bd., p. 168.
[59]W. A. N. A., p. 448.
[60]Q. N. A., I, p. 239.
[61]Q. N. A., I, p. 239

The old boar walks with slow dignity towards them—uttering an inquiring grunt. The mother faces him with mother-fortitude, and yet not without anxiety. The young ones dodge under her body. The big boar champs his teeth a little—very little—and slowly walking up, sniffs, sniffs. He is noting their smell—taking their fingerprints, as it were. And having sniffed, chopped his teeth, and yawned, he goes off. Others of the grown-ups sniff them too. Now the rusty twins have been admitted.

The whole troop heads for the water. There, under the cool palmettos, they lie sprawled till the afternoon is waning.

They are roused—by a whiff on the wind. Not a sound reaches them, but their sensitive nostrils bring notice that a great Cat—a Hunter-cat—is prowling near. With a little snort, the big boar springs to his feet, clicks the four bayonets in his mouth, and flings on the wind an intensified odour of musk. Everyone in the herd responds. The big boar leads the troop, and the sows line up. With manes erected they go, snorting, clicking their teeth, musking. With the recent mother and the two red Piglings in middle rear, they march in a wide and threatening front to hunt that hostile smell.

Soon they rout it out. He tries to hide in a low thicket, but the warrior Hogs are on him—and away dashes the Ocelot. He is swift, but his enemies are as quick, and are all about him before he knows it. In one short round, they will tear his velvet hide to tatters.

But the spotted hunter has a simple answer to their forces. He lightly springs up the nearest tree, and lies in open mockery as they swarm about and click their knives, or shrill their war cries, till they weary. The night comes on, and the Peccaries drift away to seek their evening meal.

It is cool in the Northern tropics when the sudden sun goes down; and once the band is fed, the leader heads for a huge hollow log—their own peculiar fortress. Arrived there, he swings about, investigating near thickets, or doubtful smells.

The Mother with the twins goes first, the rest crowd in; and last, the big fighting boar. At the opening of the log, he takes his stand, face out. No one can attack the herd without first disposing of him. Many a hunter has come, and seeing this keen sentry, has shot him down; then as the next one took his place, shot him down; and the next—and the next,—till only the little ones were left—an easy prey.

But such massacres took place only after guns and men became countless and unrestrained.

In the pleasant nature-balanced woods of the long ago, the sleep of the Peccary band was sweet and unbroken, till the Chachalacca roused them with his sun-up call.

Epilogue

Thus, then, skimping myself of the pleasures of the heroic and the imaginative, I have aimed to draw a true portrait.

Men who can build a big fairy palace out of a very small handful of facts, had given us the Peccary, the fearless Wild Hog—the Chevalier Bayard of his race. Then came the muck-rakers among naturalists. They smirched and crippled and degraded the Peccary till he was nothing but a dirty, cowardly little Pig.

I love the Peccary. He gave me many happy hours behind the "Jography book" in the log schoolhouse. And now I am on the bench to judge him.

But I am not impartial. I want to protect him. I would answer his calumniators. I wish to be true—but will not believe in his poltroonery nor in his baseness. I have looked into all the incriminating, damning documents, disproved their shameful lies, and can honestly say that I hope to leave to literature and to animal-loving children a Peccary that maybe is not so insanely courageous and desperately dangerous as was claimed by the Ananias-Münchausen news-agency,—for he is often afraid, but he masters his fears; often is hurt, yet squeals not. He is brave as any Lion when the odds are not obviously and overwhelmingly too great against him.

He is wise—much wiser than was said; for he knows how to retreat when it is folly to go ahead. He is loyal to his band; he is kind, he makes and keeps pleasant friendships, and is a little finer-cut character than was at one time so luridly set forth.

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A LAMENT

ON REVISITING THE OLD WESTERN RANGES

O God of the blue sky and the gentle rain,
O God of the hills in the West;
If only I could ride as I used to ride
And see the white-sterned Antelope flickering across the distant flat;
Hear the Coyotes yapping at dusk and the long soft note of the Graywolf in the dawning;
If I could see the bounding Blacktail sailing across the upland on his unseen wings,
As the Woodwale swings festooning through the woods:
But gone, gone, gone, is all I loved,
Gone, gone are the big open spaces and the sweetness of the hills.
As I try to pick my way among the barb-wire fences, the sordid settlements, and the piles of empty tins and fly-blown filth, pestilential with maggots and crawling bugs, I have no words to voice my sadness.
Gone are all the big, beautiful animals—not because they harmed us—not because we needed the land, but because we had invented weapons so terrible that the wild things had no chance. And loathsome brutes in human form destroyed them for the hellish joy of seeing them fall.
How gleefully would they have used armoured cars, gatling guns and poison gas, had such things been at hand.

What a glorious West it was—a heritage for the Sons of God.

But the abomination of desolation came to possess it.
The harmless and the beautiful withered away.
Any one that could get a horse and a gun, could kill the Buffalo.
Gone are they, with only an old bone here and there to tell of their one-time myriad race.
Gone are the Elk that bugled so joyously on the uplands.
Gone are the harmless, beautiful Bighorns from the useless bluffs.
Gone are the bannertailed Deer from the meadows.
Gone are the patient Beaver from the swamps.
Gone are the Sage-grouse, too innocent for such a besetting.
Gone are the glorious white Cranes, trumpeters of the springtime.
Gone are the simple Jackrabbits, netted wholesale, and killed with clubs.

Then, ever-intensifying ingenuity mowed down the wiser ones; then the lesser ones;
Then the Wonder-dogs, the Coyotes had to go.
And the Coyote gone, the Ground-squirrels multiplied to billions, and gathered every crop.
Then poison was invoked to destroy the Ground-squirrels.
And it finished its work, but it also killed the ground-feeding birds, so that ticks, bugs, lice, flies, insect-plagues were trillionized—and still the abomination stalks;
The very forests are reduced to blackened stumps; till man at last will be driven forth from the Eden he has ravaged.

And I—I ride with tear-blurred eyes, and turn back and away from the heritage we have desolated, scorched as with fumes of the pit.
I seek my own last home, by the little lake in the rocky hills of Connecticut, and find a measure of joy in the woods, and the wild things I have loved and saved.

But a black cloud hangs over my joy.
I know that this too will wither—is withering even now.
A wild Deer—the last of its race—crossed my land a month ago, and after it were fifty yelling curs.
I suppose they killed it. It had no chance.
Then came a few Woodcock from the North,
But a dozen gunners went after each one of them.
The brooks are marked, surveyed, to be turned into drains.
I hate your cursed, cowardly dogs;
I hate your loud, shameful guns;
I hate your sordid improvements.

The doom of the trees is impending;
The chestnut is gone; the butternut and the white pine are going; the hemlock is dying;
The red-oak and the pignut are threatened,
Nearly all with plagues imported by man.
Even now the browntail and the gipsy moth are sending the scouts of their Sennacherib hosts, and marking all Yankeeland for desolation.
The end is in sight.
The desolation sweeps from sea to sea.

I can find some tiny crumbs of comfort in this alone—
That when it comes complete, I shall not be here to see it.
Only in prevision shall I see it—see my people pay the bitter price of their greed and carnage.

And farther yet my soul-view reaches in the years.
I see the only logical completeness of this hell-born mania to destroy—
This—surely this: the nation possessed of it, will certainly destroy itself.
And when the men of another race, a yellow, or mayhap a red race, shall discover this unpossessed, broad, Western world, landing on Manhattan, they shall marvel at the piles of ancient ruins.
And slowly unearthing shreds of proof, and scraps of records, ancient made,
Their chiefs and wiser ones shall know, that here was a wastrel race, sordid, cruel, sordid;
Weighed and found wanting,
Once mighty but forgotten now.
And on our last remembrance stone,
These wiser ones will write of us:
They desolated their heritage;
They wrote their own doom;
They knew not the things of the Spirit;
They never lighted the fourth lamp of the Woodcraft Altar fire.

THE END

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